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QUEENSLAND AGRICULTURAL JOURNAL

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Event and Comment.

The Current Issue.

Among the more important features this month is a continuation of notes on the organisation of the agricultural industry, in the course of which the principles and practice of co-operation are lucidly discussed. Some very valuable tables of soil and other chemical analyses are included in a continuation of a summary of experiments carried out by the Bureau of Sugar Experiment Stations. Notes on picking, grading, and packing of fruits form another notable contribution. The notes are profusely illustrated and will be issued later in bulletin form. What has been described as the Jensenian theory of sunspots and their climatic relationship is covered in a very interesting article. Illustrations and other usual features are well maintained and in all respects the May Journal is a very informative number.

Co-operative Marketing.

As has been indicated directly or impliedly in the course of notes on the organisation of the agricultural industry in this and preceding issues, and presented lucidly and attractively from first-hand information and experience in California, where co-operative marketing has been developed to a high degree of efficiency and success, the aim of the Queensland Producers' Association should be early and effective control of the selling end of the farmer's business. The people of Queensland have awakened to the truth that agricultural prosperity spells general prosperity and more attention is being given to the fact that, as in other enterprises, business efficiency and business organisation must be applied to the marketing of primary products. The people of the cities are beginning to realise that rural problems are their problems, and that their interests are inseparable from the interests of those engaged in the State's great basic industry. Hence, any improvement on existing systems of marketing and distribution must naturally benefit both producer and consumer alike. It is felt that the co-operative principle which has proved so successful in farmers' manufacturing ventures, particularly in the dairying industry, must extend inevitably

to merchandising activities, hence the necessity of closer study of systems of co-operative marketing. In nearly every civilised country farmers are now engaged in some form of combined bargaining both in respect to their requirements and disposal of their produce. In countries like Denmark, where rural co-operative enterprises may be seen in full and vigorous working, organised co-operative marketing of farm products has been in vogue for more than half a century. In the dairying industry there more than 90 per cent. of the producers are completely and co-operatively organised, and in the live stock and other sections they are organised to the extent of over 85 per cent. In Great Britain, Ireland, the countries of Europe, Canada, and the United States of America growers have absorbed the lessons of co-operation, not only in relation to marketing, but also in respect to credits and allied problems. To all who take time off to think it seems amazing that the industry that creates so much national wealth, that takes so much out of the consumer, leaves so little for the men who primarily create that wealth. It is plainly the job of the Queensland Producers' Association to see that in this State existing anomalies and disabilities are corrected and removed and that, so far as its power extends, the real business interests of the wealth producers are adequately conserved.

Farmers are Wide Awake.

The farmers of Queensland have been stung into action and now realise fully the necessity of a proper knowledge and handling of the manifold problems peculiar to their calling. If the cityward migration of the rural population, a tendency so strongly marked in Australia though common to all countries—a tendency calamitous from a national point of view—and consequent decline in agriculture are to be checked effectively, it can only be done by making agriculture both attractive and profitable. If enlightened country youths are denied ordinary prospects, advantages, wholesome recreation, amenities and opportunities of social and business life, then they are not likely to stay on the farm. Make agriculture profitable and a long way will have been gone towards solving that and many more of our present problems. Farmers with a knowledge of their power and driving force as an organised body demand, naturally, a fair return on invested capital and energy. Of the objects now in view, and with the means of attainment now available, the establishment and extension of co-operative enterprises are among the most important. Hitherto farmers have been content to co-operate up to the railway truck, but now they demand an effective voice in the marketing of their products. They aim to regulate the selling end of their business—regulation that will ensure security and other benefits that naturally accrue from stabilised industry. California provides an outstanding example of complete co-operation in the agricultural industry, and a study of the lines on which the system works supplies a stimulus for extending to their limit the means now in the hands of the farmers of this State through the Queensland Producers' Association.

The Queensland University and Agriculture.

In the course of an address as Chancellor of the Queensland University on the occasion of the annual conferring of degrees, His Excellency the Governor (Sir Matthew Nathan) mentioned appreciatively the benefactions received under the Walter and Eliza Hall Trust, through which useful work has been done in combating the blow-fly pest so ruinous in its effects on the pastoral industry. That work still calls for heavy expenditure for its completion; and it is only one of the pressing problems confronting our rural industries. The importance of applying science to all sections of agriculture is recognised, particularly in relation to fruit and sugar. Much has been done and much remains to be done. The munificent gift by Dr. Mayne, of some hundreds of acres on the Brisbane River within easy reach of the city, will doubtlessly accelerate the establishment by the University Senate of a base for experimental and research work in connection with agriculture.

Cotton Ratoons.

Replying recently to a deputation representative of a Central District Council of Agriculture, the Premier (Hon. E. G. Theodore) said that the way was not clear to remove the restrictions on the production of cotton ratoons. It was the Lancashire

market, continued Mr. Theodore, upon which, so far as he knew, we had to depend solely. It was hoped to build up to a million acres in Queensland; for its product a large market was wanted, and the only market he knew of was that of Lancashire. The Lancashire people definitely said that they would not use ratoon cotton, and that if even only a small percentage of it was included it would depreciate the whole crop. It would be very foolish not to heed that point. Then there was the position in respect of pests to be considered. The representation made by the delegation to the Prime Minister and himself were strongly worded and very definite. This restriction was a condition under which the Commonwealth guarantee was made, and also of the Queensland Government's guarantee. Mr. Crompton Wood himself had suggested that ultimately there might be an outlet in the East for ratoon cotton. He (Mr. Theodore) understood that the Lancashire mills only bought ratoon cotton from one country—they took the whole of its crop—and the growers, who produced that crop by black labour, had to be satisfied with much smaller prices than that paid for cotton produced elsewhere. Messrs. Crompton Wood and Harold Parker, and others they represented, it must be remembered, added the Premier, were not only buyers of cotton, but they were large investors in the cotton industry here. It would be seen that they had much at stake, and when it was said on their behalf that the ratoon article would not be accepted as legal tender, then it was obvious that it must be an inferior article from their point of view. The Government policy was to bring into force legislation to provide for the proper regulation of the industry, and for its preservation and rapid expansion. That involved the prohibition of ratoon cotton and the absolute destruction of the old shrubs and debris in the fields. Before this legislation was settled the Council of Agriculture would have the opportunity of consulting with and of advising the Government as to its views on the subject.

Small Ratoon Area.

Mr. Theodore said that a definite policy must be maintained. It was noteworthy, by the way, that only 240 acres of ratoon cotton were harvested in Queensland this year out of the 40,000 acres under crop. He considered that the correct policy for the Government to adopt was not to agree to ratoon cotton being produced until it was proved that it was the right thing. He felt that he would be recreant to his trust if he gave the undertaking sought. There had never been any doubt as to the attitude of the delegation on the ratoon question, and that was the attitude of the Government.

The Dairy Bull.

The change in the appreciation of the influence of the bull on the milk yielding qualities of the offspring since the movement for improving the dairying qualities of milking breeds began twenty-five years ago is agreeably significant. In a cutting from the London "Times" (5th March, 1923), sent to us by the Agent-General (Hon. J. A. Fihelly), it is noted that the discovery of the real value of the bull in a dairy herd has been of great importance to farmers and breeders in the Old Country, where the art of breeding and feeding has developed to a high point. It has cheapened and expedited the process of grading up the milking records of herds where the knowledge has been wisely applied. The purchase of a bull at a three and even four-figure price may savour of extravagance in pursuit of some wild notion, but experience has given a generous measure of justification for such liberality. If the calculation errs, it is usually the animal rather than the price that is at fault. After all, a high price for a bull entails a smaller total outlay than the purchase of many costly cows or heifers. The influence of the latter is not to be despised by any means; but results have shown that astonishing improvement can be effected quickly, and, in a broad sense, inexpensively, through the introduction of suitable sires. This is supported by definite testimony pertaining to all breeds. In fact, the reputations of many of the best-known herds have been made through the influences of the sires used. The choice of a bull—or of a sire of any kind—is one of the most difficult duties of a stockowner. It is aggravated by the fact that the sire is as impressive in transmitting undesirable influences as he is in giving the qualities that the breeder wishes to cultivate. An error in introducing a sire may be very costly, hence the importance of systematic and minute study of lineage and individual records.

ORGANISATION OF THE AGRICULTURAL INDUSTRY IN QUEENSLAND—III.

BY J. D. STORY, Chairman Administrative Committee, Council of Agriculture; and J. F. F. REID, Editor of Publications, Department of Agriculture and Stock.

In the first article of this series, published in the March Journal, the American Farm Bureau Organisation was described and compared with the plan of the Queensland Producers' Association. In the second instalment, which appeared in the April Journal, various phases of American marketing methods, relating more particularly to fruit, but capable of more or less diversified application, were discussed. This article is a continuation of the series and deals with primary producers' marketing problems and co-operation generally.—Ed.

CO-OPERATION.

Historical Sketch.

The fundamental ideas of individuals combining forces or co-operating in various ways to achieve certain objects are not by any means the product of recent years. Centuries ago the difficulties of foreign trade made it extremely important that, even in European ports, Englishmen should hold together and maintain by good conduct and a high standard of honest trading the reputation of their countrymen. It was found that one dishonest or greedy English merchant could endanger the trade in a country for all the rest, by selling inferior wares and by other bad conduct calculated to make Englishmen and their goods unpopular. Such considerations led to the formation of companies of merchants, to each of which was given the sole right of trading to a particular region, and also the power to make rules and regulations to be observed by every individual member.

At least one such company was originated as early as the 14th century and was known as the Company of Merchant Adventurers of England. Each merchant or firm of merchants included in the company traded separately and undertook separate risks, but was bound to observe the rules of the company and to pay entrance fees and other dues to its common funds. In each foreign port to which the members traded they erected what was known as a factory, which combined residential quarters for the staffs, warehouses for storing goods, and counting-houses for the sale of goods. Strict rules were imposed regarding the conduct of members and the quality, price, and quantity of goods sold.

Since the establishment of this company there have, of course, been many changes in world conditions. It is important, however, to note that with changing conditions, different types of organisations were brought into being to meet the new requirements, and that the tendency for persons to combine for given purposes is stronger to-day than ever before. At present we have various forms of associations—business partnerships; private companies; public companies; firms having provision for profit sharing; co-operative companies, associations, or societies—and in all of these there is the underlying principle of combining forces to attain specific objects which the members individually could not attain.

Mutual Help—Service versus Self.

It is recognised that individuals cannot progress beyond a certain point so long as they are prepared only to receive help from others and give nothing in return. American business men hold conventions for each class of occupation or business, and the men who attend do not merely get all the information they can; but they relate their own experiences, exchange views, discuss matters of mutual interest, and help others to solve problems that confront them. Having given freely they receive freely, and the result is that the whole of the industries of the nation are raised to a higher standard of efficiency. Such mutual help or co-operation within an industry is not, however, a cure for all ills. The man who is industrious and applies himself to his work along sound lines must fare better than the man who is indolent and indifferent; the man who is thrifty will be better off than the man who saves nothing; the man who has executive ability, who can plan, organise, and direct others, and so make his business more productive, will advance further than the man who only does what he is told.

The Relationship of Industry to State.

But each industry must be regarded as more than a collection of individuals competing for the supply of certain markets—it stands in a well-defined relationship to the State, to the consuming public, and to transport and financial systems, on which all trades and businesses depend. It has its own problems, its own questions of organisation and methods of production, its own peculiar difficulties regarding access to markets, and should have its own organisation. In that organisation all questions affecting the welfare of the industry should be discussed monthly, fortnightly, or weekly as the conditions may require. The whole experience of the industry, the knowledge of its most experienced members should be open to all members, who will then have more than their own knowledge and ability to rely on, and will be able, if they so desire, to proceed along sound lines, to make use of better methods and to reduce the chances of failure.

A Concrete Example.

As a concrete example of the need of such co-operation in the agricultural industry, it was found that in America in 1921, considerable difficulty was experienced in the marketing and distribution of farm products. Because of its inter-relationship with agriculture, the social and economic structure of the whole nation was vitally involved. This condition was the result of many complex factors brought about in a measure by the readjustments consequent upon the close of the war; but the most important reason was the unpreparedness of the American farmer to handle, through collective action, the problems which as an individual he was unable to solve or even to influence.

It is worthy of note that in California, where the horticultural industries were well organised, the producers were able in most cases to market their crops at prices in excess of the cost of production; and that these co-operative organisations of growers suffered comparatively little from the general business depression.

The Essentials of Co-operative Agricultural Organisation.

What then are the essentials of co-operative agricultural organisation? The late Mr. G. H. Powell, who was for nearly ten years General Manager of the California Fruitgrowers' Exchange, and who was regarded as a national figure in agricultural affairs, has supplied the following definition:—

"Co-operation among farmers may be defined as an enterprise in which the members form an agency through which they conduct the business for their greatest mutual advantage. To be co-operative it must be composed of farmers exclusively, and managed by them, and the benefits must be returned to them in proportion to the use or the patronage of each. That part of the capital necessary to create the agency and its facilities, which finds an expression in the management of the association through the voting of the members, should preferably be contributed by them in proportion to the use which each makes of the organisation. And it is desirable that the capital of each member should be kept progressively proportional to the individual shipments, or purchases, or other uses made of the agency as nearly as this may be done. In a co-operative agency, capital which creates the permanent investment, should be considered as a means of providing the facilities needed by the members; it must not be a fund on which a dividend is paid in excess of a fair rate of interest. Working capital may, of course, be provided in other customary ways.

"In forming a co-operative marketing association, it is fundamental that it be a proper legal entity, with sufficient powers to transact the business for which it is formed, to finance its activities, and, when necessary, to secure its obligations—thus, equally with other corporations, safeguarding the interests of its members, as well as of the institutions with which it transacts business."

Producers' Problems can only be Solved by Producers.

The questions which affect the stability and permanently successful development of the agricultural industry can only be worked out by the producers co-operatively. They will not be solved by anyone else because no one but the producer has a primary, vital interest in production. They will not be solved by an individual producer.

The progress that has been made in every question affecting the production of Californian citrus fruits, for example, has resulted exclusively from the initiative and the co-operation of producers. Those who handle the growers' product for them sometimes follow but they cannot lead in the progress of an industry. *Their* interest in the problems of production is secondary.

A co-operative organisation, to be permanently successful, must be founded on economic necessity. It must be composed exclusively of growers, and it must be financed exclusively by growers. None has succeeded in which the growers and the buyer and speculator are joined together, because the interests of the two are not the same. The grower's primary interest is in the permanent prosperity of his investment; the buyer's or speculator's is primarily in the success of his immediate business transactions. Only the man who owns the land and whose investment runs into the future is willing, or is in a financial position, to make investments that safeguard the future of an industry.

Legal Right to Organise.

Farmers should have the legal right to organise, to do those things that are vital to the economical and orderly conduct of their business from the production to the consumption of their products; to act collectively in doing what the individual farmer would otherwise do for himself; to form purchasing, warehousing, distributing, or other necessary agencies; to confer amongst themselves and to acquire and disseminate information for the orderly purchasing, distributing, and marketing of their supplies or crops; to finance their undertakings and to enter into financial relationships to handle agricultural problems.

Membership.

A co-operative organisation should have an open door policy—that is, one by which every grower, who will conform to the policies of the association, who will abide by its rules and regulations, and who will assume his share of its responsibilities, may be admitted to membership. It is equally important that a member be permitted to withdraw from the organisation if he should become dissatisfied, provided his withdrawal is in accordance with the by-law or contract provisions governing withdrawals. No grower should be held permanently in a co-operative association against his wish. In the long run the benefits of a co-operative association are the only things that will hold the members together.

Membership should be confined exclusively to producers engaged in the production of the particular commodities with which the association is concerned and who actually use its facilities. Those who would contribute capital only should never be admitted, because the permanent capital should be the medium through which the members provide the facilities for the transaction of their own business. Membership carried with it a responsibility on the part of each member to maintain the association in periods of adversity—a responsibility which is not likely to be felt unless the organisation is the farmer's own institution, developed and managed by him, through his chosen representatives, to promote and safeguard his own interests.

Agreements.

An association must be held together through an agreement or contract between the organisation and each member. Such a contract gives the organisation a stability which enables it to know what it is expected to do, to enter into dependable business relationships, and to make necessary financial or other preparations essential to the conduct of its affairs. Nevertheless, contracts cannot hold a group of farmers together against their will, and do not in themselves assure the permanency of an association. The association's greatest safeguard against disruption, as well as its strongest business asset, is the development of faith amongst its members, confidence in the director and management, and a growing conviction that the best method of meeting the farmers' common problems lies in their co-operative efforts.

Objects.

The objects for which the agricultural industry may be organised have been dealt with in a general way in the two previous articles. It might be emphasised here, however, that these objects will come under two main headings:—

(1) General questions affecting the industry which can to a great extent be dealt with by the farmers themselves in consultation and co-operation with State institutions, like the Department of Agriculture and the University, and which do not involve the raising of capital for specific purposes.

(2) Particular questions affecting particular sections of the industry, such as the marketing and distribution of products and of obtaining supplies, which will involve business arrangements with existing distributing agencies, or the creation of co-operative agencies for the marketing of members' products and the purchase of their requirements. These co-operative enterprises would require arrangements for the subscription of capital for the working of each undertaking.

The farmers engaged in the industry will themselves be the best judges of what is required to increase production and to render the labour entailed in that production as little irksome as possible. With the help of the State institutions referred to, the association of farmers should be able to evolve schemes and methods of meeting those requirements.

The farmers, however, may not be quite so well qualified to determine the essentials of successful marketing and distribution, and it may be helpful to state a few general principles which have been laid down in America as a result of the experiences of marketing associations.

Essentials to be Observed in the Formation of Marketing Associations.

The ultimate success of any co-operative marketing effort depends on the will of the farmer to co-operate, on a spirit of mutual confidence and trust in one another, on the development of the most adaptable forms of organisation and the most efficient management and procedure.

One cannot over-emphasise the fundamental necessity of confidence, faith, and sentiment among the members of a co-operative marketing association; nor can one overstate the need to develop and maintain mutual confidence, and to utilise every known means to keep the purposes and accomplishments of the organisation before the members and the general public.

Where possible local associations should be formed by small groups of growers who are neighbours and have confidence in one another. These neighbours should provide packing houses, warehouses, and other permanent facilities through the investment of their own capital; they should take part in the local management and be an intimate, personal part of the institutions. These local units become centres of vital influence for good in the community. They promote every activity that affects the upbuilding of country life, because the members learn to meet the problems together. Where a larger unit may be necessary, those responsible for its direction should never lose sight of the need for local participation and some degree of responsibility in the affairs of the organisation. Failure to do this and to keep the members fully informed is likely to result in a large impersonal association in which the individual member is removed from participation and responsibility in solving his local affairs. Because a large co-operative marketing organisation represents power its danger lies in the possibility of its becoming involved in political affairs, and in movements which, though worthy in themselves, have nothing to do with its primary purposes and can only lead to divided membership, factional control, and ultimate disruption.

THE CAPITAL IN A CO-OPERATIVE ORGANISATION.

The California Fruit Growers' Exchange, a central organisation which deals with general matters of administration on behalf of its District Exchanges and local associations, has no capital stock. Each year it estimates the cost *per box* of transacting its business, then levies an arbitrary assessment for the year, and at the end of each month renders a bill to each District Exchange for the number of boxes shipped during the month. It does not take the marketing cost out of the proceeds before returning them to the District Exchanges. At the end of the year, if a surplus has been accumulated, it is pro-rated to the District Exchanges on the basis of the shipments of each. The Exchange makes no profit, receives no dividends, accumulates no surplus.

When a producers' organisation requires capital for the purchase of supplies, erecting packing sheds, or for other purposes, the Exchange has worked out a plan by which the capital contribution of the stockholders is kept permanently proportionate to their shipments by the establishment of a revolving fund into which the stockholders agree to pay annually a specified amount per box on each box sold. Interest at the rate of 6 per cent. is paid on the capital so contributed, but no dividends are paid. The corporation is not formed for money-making purposes. The capital is necessary to provide the facilities through which the members transact their business, and both the benefits and capital contribution of the members are always kept proportional to the use which the member makes of his facilities. American agriculture can tell of the wrecks of all too many farmers' organisations that were formed as stock corporations, with disproportional capital contributions of the members, with no way to retain the capital within the organisation, or to keep it always proportional to the shipments of the members.

AVOIDABLE WASTE—TRADE CO-OPERATION.

The establishment of uniform grades for agricultural produce is one of the most important questions affecting American agriculture. It is equally important to the producer, the trade, and the consumer. The waste that occurs in badly-

handled, ungraded farm products is one of the leading causes of the high cost of distribution, because this waste must either be deducted from the farmer's price or added to the cost of distribution. It is important to the wholesale trade because the merchant cannot sell at low, gross margins unless foodstuffs are uniform and dependable in grade and quality. It is equally necessary to have an equitable, dependable supply of a good product in the hands of the retail merchant, if he is to add only reasonable margins in the sale of his products.

In the California citrus fruit industry, for example, the former average loss of one and one-half million dollars annually, caused by decay due to bad handling by the individual grower, has been practically eliminated by standardised association methods of harvesting and packing. The cost of distributing the fruit from the producer to the wholesale trade, exclusive of freight, has been reduced from 15 per cent. to 2⅔ per cent., including the cost of national advertising; while the dependable supplies furnished by the co-operative organisations have made it possible for the wholesale and retail trades to sell these commodities at gross margins not much in excess of those added in the case of non-perishable foodstuffs.

The California Fruit Growers' Exchange has proved that it is difficult for any fruit centre to become known in the markets of the country, and especially to the great consuming public, unless the fruit is handled, graded, and packed under standard rules and regulations, and sold under an association trade mark brand, each local unit retaining its own local brand in addition to the trade mark to identify the quality of the fruit of any district. To supply the quality required by customers the dealer buys on the known quality of the local brand, while the consumer buys on the advertised trade mark of the general association. The trade mark is the guarantee of the association to the consumer and the public. It represents a minimum standard grade, with various grades above the minimum representing the quality of fruit of each community.

An unadvertised local, or buyer's, brand may have been sold for years in a community and not be known to 2 per cent. of the consumers who have actually used the fruit, while a nationally advertised brand will be known to from 30 to 50 per cent. of the consumers in the same community.

Wasteful Speculation.

A co-operative organisation may be able to eliminate the unnecessary, wasteful speculation that is sometimes inherent in the purchase of farm products at the farm or local station, by selling through its own agents to the wholesale trade on arrival in the places where the products are to be consumed. This system of delivered sale, if well administered and adapted to an industry, assures a more dependable, equitable distribution; it eliminates speculation in purchase and in distribution, and it supplies the trade with the daily requirements at prices which must necessarily closely reflect the law of supply and demand.

In 1921, the delivered method of selling was one of the outstanding factors in saving some of the California horticultural industries from a collapse similar to that which occurred in other parts of the country. The production of the crop was financed by the growers' local bank. Through his organisation, the grower distributed his product throughout the country at his own risks—the banks did not have to finance a speculative buyer, thereby making it safer for them to finance the grower who produced the crop and distributed it in an organised, intelligent manner to the consuming centres. The wholesale trade bought their current requirements from the growers' agents on the arrival of the cars; the retail trade, in turn, bought their daily supplies from the wholesale dealer, thereby reducing the hazard of the banks that supplied the credit for the daily merchandising needs of the wholesale and retail trade.

AGENCIES OF DISTRIBUTION.

In every agricultural industry the crop needs to be financed, assembled, processed, packed or stored, and transported, and with or without further manufacture sold by the wholesale and retail trade to the consumer. There should be no antagonism between *essential* agencies involved, but rather a real understanding of the functions of each and a close co-operation between them. Until an industry has clearly analysed the problems, and has an accurate knowledge of financing and distributing processes, it is a mistake to assume that a remedy for the marketing difficulties lies in the elimination of one or more of the existing agencies of distribution. These agencies may have grown out of vital needs of distribution. Only after a farmers' organisation has proved that it can perform the same service more efficiently or more economically should it decide to eliminate any of the existing links in the chain of distribution. But it should co-operate with them in order that

there may be a clear understanding of each other's problems, a supplementing of each other's efforts, and a development of the simplest and most economical methods.

There should, therefore, be the closest co-operation between a producers' organisation and the wholesale and retail trade. The latter are the distributing agents which bring the producer and consumer together, and the span can be efficiently and economically bridged only when there is a mutual understanding of each other's problems. The producer cannot deliver his fruit to the consumer without the retailer. The risk and the cost are both prohibitive.

The system of trade which gives the widest distribution must be based on uniform supplies of evenly-graded fruit, backed by national advertising. Given these conditions, the trade can then specialise on a commodity, display it prominently, advertise it locally for immediate results, and make quick turn-overs at a relatively low mark-up, thereby increasing distribution at a lower cost to the consumer, but a larger annual profit to the merchant.

Anything that can be done by the State or nation which is impossible of achievement, either by the individual farmer or his organisation, that helps them to a better understanding of their problems, that develops the factors which affect the handling, storage, and transportation of crops, that furnishes dependable information on crop production, or other information that serves as a guide to intelligent distribution and sale, and that insures the principle of a "square deal" in all business relationships, is in the interest of the producer, the trade, and the public alike. It is in the public interest that those branches of the Department of Agriculture, which furnish this basic crop-production information, as well as the regulatory branches of the department, shall be adequately supported and effectively developed.

THE NEED OF NATIONAL ADVERTISING.

Advertising to the consumer is fundamental in increasing the consumption of a rapidly increasing production. It increases the per capita consumption and develops new consumers. It widens the growers' markets and produces a consumer demand which helps the wholesaler and the retailer, who are primarily order takers. It strengthens the relations between the grower, the trade and the consumer. It makes it possible for the wholesaler and retailer to sell quickly at lower margins per turnover, and to give the consumer a product uniformly distributed at a lower cost of distribution.

A Pride and an Investment.

There has been no single factor that has strengthened the California Fruit Growers' Exchange among its members as much as its national advertising. The growers have a pride and an investment in the trade mark "Sunkist," that makes the enforcement of the grading rules comparatively easy. They have a pride in putting out a good product. They place "Sunkist" signs on their packing houses and on their groves. An association that deliberately breaks the rules quickly falls into disrepute among the other associations.

The Fundamentals.

The fundamentals that are essential to a growers' campaign of national advertising may be thus summarised. The growers must be organised on a sound permanent basis; they must have a large volume and pack their fruit under standard grades; they must provide a system of inspection to enforce the rules; they must own and control their trade mark; and they must establish a system of national distribution to the wholesale trade in order to insure evenness of distribution.

A Solid Foundation of Quality.

Every successful selling campaign must be built on the solid foundation of quality. If a product is of good quality it will pay to tell people about it. Some of those who hear will buy, and if the quality pleases them they will buy again and tell others. Co-operative advertising campaigns cannot trifle with details; the controlling motive must be the greatest good for the greatest number. If the problems do not affect all members of the industry, those members will not be deeply concerned.

The greatest difficulty in selling, however, does not always come from our competitors, but rather from the public's ignorance or lack of appreciation of the product and its uses. Often the greatest opportunity for increasing sales lies in increasing the basic market—in educating public demand.

A Supplement of Personal Salesmanship.

Co-operative advertising can assist by supplementing personal salesmanship and by making it more effective. It can correct misunderstandings; it can foster goodwill by pointing out services and policies of mutual benefit; it can educate the consumer to be a more discriminating buyer and set up trade marks for the buyer's protection; it can promote standardisation and dependability for developing incentives for uniformity in quality.

RELATION TO THE PUBLIC.

A co-operative organisation has a public interest relationship, which it must scrupulously fulfil, as well as the relationship to its members. It cannot live for itself alone.

A co-operative organisation of fruitgrowers, by illustration, should be an important factor in reducing the cost of living as well as insuring the growers a fair price for their fruit if it is to play a vital part in future social and economic life. The producer is entitled to a fair return on the cost of production, if the law of supply and demand warrants it.

Reduction of Costs Means Increased Output.

The co-operative organisation, however, should make a larger output possible by reducing the cost of production through the co-operative purchasing of supplies, by the joint use of tractors and other implements, and by co-operative pruning, fumigation, and harvesting. It should reduce the cost of packing by the more economical method of co-operatively purchasing packing-house supplies and by co-operative packing; it should reduce the cost of distribution to the wholesale trade by even distribution and national advertising, and it should help to place the wholesale and retail distribution of fruit on a merchandising rather than a speculative basis. By doing these things it reduces the distributing costs of the trade to the consumer.

Expenses of Association should not mean Restricted Production.

These are public relationships that should be inherent in the legal right of producers to organise. They are responsibilities which no co-operative organisation can safely avoid. No group of producers has the right to operate collectively if it uses its power of organisation to restrict production, to lessen or arbitrarily control the supply, to permit avoidable wastes that result from improper handling in preparing fruit for market, to speculate, to profiteer, to create any condition through the power of its organisation that is discriminatory or unfair to the public or to a competitor, or which permits a member, an officer, or an employee an advantage, a rebate, or a preference that is not open to all alike.

A large share of the cost of food is represented in the cost of selling or marketing. As a public question, this fact has a vital significance in these times of high living cost on account of the flow of population towards the cities. It gives new impetus and a new vision to the co-operative movement which, by simplifying the distributing process and reducing costs, may help to meet a present day social and economic need. Unless a producers' organisation confers a benefit on the public at large, as well as on the industry which it represents, its future as a vital part of the social and industrial fabric of the country is problematical; and the progress of co-operation will be measured by its ability to meet such problems.

[NOTE.—For much of the Californian information contained herein the writers are indebted to the late Mr. G. H. Powell and the officials of the California Fruit Growers' Exchange.—Ed.]

CONCLUSIONS.

A review of the principles laid down by American leaders of co-operative enterprise suggests—

I. That the Queensland Producers' Association, as the State Organisation of Queensland primary producers, should be representative of the whole of the agricultural industry.

II. That is members must conform to the policy which is determined by the majority, and which is calculated to be of the greatest good for the greatest number. They must be loyal to the Association; they must be unselfish and willing to assist each other; they must make available for the benefit of the industry the information they have collected and the results of their experience; and they must each take a personal and keen interest in the business of the Association.

III. That problems relating to the whole industry must be considered by the whole Association, and there must be equitable contribution of funds required to meet expenditure necessary for the conduct of the general business.

IV. That problems relating to particular sections of the industry or to specific districts must be considered by sectional bodies representative of those sections or districts. If capital is required for the benefit of particular sections or districts, or to establish local trading societies or other forms of co-operative enterprise, that capital must be contributed by the members concerned in the proportion in which they will participate in the benefits or use the facilities provided. Any such sectional bodies or societies must be linked up with the main Association, and the whole strength of the Association must be available, if necessary, to back up the actions of each or any section.

V. That the Association and every section of it must be willing and ready to co-operate with existing associations and agencies, with the Agricultural Department and the University, and with any other institutions that are willing to co-operate in the solving of problems relating to the economical production and orderly distribution and marketing of primary products.

An Association which will work energetically and consistently on these lines will do for the agricultural industry in Queensland what no other forces can do. In due time it will provide an organisation which will know better than any individual or department what is best for the industry; it will advise the Government of the day as to necessary agricultural legislation and regulation; it will by full and free discussion educate its members in regard to its relative importance in the forces that go to make up the State; it will, by co-operation with other bodies and agencies, arrive at a correct understanding of the interdependence of industries and of the importance of having all the forces of the State perform their proper functions and of their receiving their due proportion of the State's wealth.

Such, then, are the possibilities ahead of the Queensland Producers' Association, and the Association will progress towards the fulfilment of those possibilities just so quickly as its members are ready to progress. Wide powers have been placed in the hands of Queensland producers—it is for these producers to use those powers to their full extent or to render them inoperative by neglect or indifference. A co-operative association is not a magic circle that will banish the troubles of members immediately they join; but, if the producers of Queensland will act in concert, help one another, plan and work for the common good, they will accomplish much more for the general prosperity of the industry, and for its stabilisation and extension, than they can possibly do individually—that at least has been the result of co-operation in other industries and in other countries.

THE COTTON GUARANTEE.

The Coming Cotton Planting Further Encouragement of Growers.

In January last an announcement was made that for the year ending the 31st July, 1924, the advance to be made by the Government for seed cotton delivered at the nearest ginnery or as might be otherwise arranged would be for seed plant cotton of good quality free from disease and defects of 1¼-in. staple 5½d. a lb., and for less than 1¼-in. staple 4½d. a lb. The advance to be limited to areas not exceeding 50 acres.

The Minister for Agriculture (Hon. W. N. Gillies) now desires to make it clearly known to growers that the Government, owing to the drought and the consequent circumstances of the industry, has decided to make the advance for the year ending the 31st July, 1924, as follows:—

For seed plant cotton of good quality, free from disease and defects of 1¼-in. staple	5½d. a lb.
If of lesser staple than 1¼-in.	5d. a lb.

The other conditions issued in January last in relation to the advance to remain.

Thus it will be seen that growers will, owing to this decision of the Government, be in a better position to make their arrangements for the coming planting. No alteration has been made in relation to the advance for seed cotton of 1¼-in. staple, and for seed cotton of lesser staple the advance has been increased by ½d. a lb. over the January conditions, and the encouragement thus given should ensure an area under cotton that will be considerably in excess of the area planted in 1922-1923 with a great increase in the harvest; if there is an improvement in the season on that of last year, that can be reasonably looked for.

COTTON CULTIVATION—A GROWER'S EXPERIENCE.

Mr. Alec. W. van Tienhoven, a cotton-grower, of Alma Creek, N.Q., writes, *inter alia*, to "The Queensland Producer":—I planted about 5 acres with cotton in the second week of September (against expert advice), which took about 80 lb. of seed, or about 16 lb. per acre. I never thinned this out (which I did last year, with no beneficial results), but I got the rows 4 ft. 6 in. apart, and kept it well cultivated. The results are that the first picking gave nine bales of (average) 386 lb. of seed cotton, ginnery weight at Wowan, which is, in regard to the dry weather, not a bad result. The second picking will, to all appearances, turn out very good. In this cotton I never found a corn-grub or any other kind of pest, which are doing so much damage to the late planted crops.

In regard to the shedding of the flowers by little bolls, I would like to state that the same happened on my well-spaced cotton of last year, and that several of my neighbours were complaining of the same trouble.

In the beginning of October I planted another lot, also about 16 lb. of seed to the acre, and no thinning out, which is now being picked and giving a fairly good return, taking the season into consideration. There are no grubs in this lot, but another lot, which I planted in the beginning of November, gave plenty of signs of grubs, and never did as good as the early planted cotton. The weather was hot and dry in November and in the beginning of December, and no doubt this has a lot to do with the grub pest. In the latter end of December and the beginning of January we had about 9 inches of rain, with the result of a splendid growth of weeds. A few months before this I got some advice in regard to cultivation implements, and with the poor start, the rain, the weeds, the grubs, and that advice just about settled my late cotton. Had I been advised to get a disc cultivator instead of the spring-tooth cultivator (a farmer wants both) I and many more farmers who had the same advice would have a better result from the late planted crops. The disc cultivator makes the weeds look pretty sick after a single trip over them, and if the cotton is hilled up with the second or third trip most of the weeds are then covered, and by that time just about settled, and the moisture left in the soil for the cotton plants. The spring-tooth is a splendid implement, but it is no good when the weeds have such a good start on the cotton as they had with the last rain.

My experience this year is that cotton planted in September and the beginning of October, in a well-prepared seed-bed, and planted at the rate of 16 lb. of seed to the acre, rows 4 ft. 6 in. apart, gives the best results. I find the picking far easier and cleaner, as there are no long branches as is the case by the well-spaced cotton, and I find also that the early planted cotton plants are not attacked by the corn-grub.

No doubt, with a better class of cotton seed and the experience the growers gain more every year we can produce a first-class article, fit to compete in the world's markets.

In the meantime I would like to read the experiments of other Queensland growers. The experiences of the Queensland cotton-growers are, in my opinion, the best advice of all.

Why not give the cotton-growers illustrated lectures of the different pests? The way it is now, no farmer knows anything about the boll-weevil, pink worm, &c., &c. We had some fine coloured pictures of the sugar pests and its enemies in the "Agricultural Journal"—why not give the same of the cotton pests?

IMPACTION PARALYSIS OF CATTLE IN QUEENSLAND.

By JOHN LEGG, B.Sc., B.V.Sc., M.R.C.V.S., Government Veterinary Surgeon, Townsville.

The term Impaction Paralysis is used to describe a disease which has been occurring for some years past in certain areas in North Queensland, and which has been responsible for considerable losses. The term is used because a study of the history of the outbreaks, together with a consideration of the symptoms and post-mortem appearances of animals dead of this disease, leads one to believe that the disease is similar to the condition known as Impaction Paralysis in Victoria. The same disease appears to be identical with the "Dry Bible" of cattle in South Australia, and the "Midland Cattle Disease" of Tasmania. The writer can find no reference to this disease in any of the departmental reports or Journals at his disposal, and it appears that the disease up to the present time has been unrecognised, hence the reason for recording it here.

Occurrence and Distribution.

So far the disease has been found to occur on two selections outside Charters Towers, North Queensland. The size of these selections is about 17,000 and 20,000 acres, respectively. Here on these two areas mortality has been high, but the disease does not appear to be confined to these areas. Reports have been received that cattle have been dying from an unknown cause in various other localities in the Charters Towers district, and a report was recently received concerning the death of cattle on one run close to the boundary of the Townsville-Clermont stock districts. The description of the symptoms given by the owners leaves little doubt that we are dealing with the same disease.

The disease occurs at all times of the year but shows little signs of spreading. The properties now infected have probably been infected for years.

Symptoms.

Cattle of both sexes and of all ages over eighteen months are susceptible. Rarely is it seen in young cattle, and it is probably more common in cows than in steers.

The first sign of anything being amiss is shown by the animal standing apart from the others and if driven lagging behind. It walks with a sort of "paddling gait" as if the feet were tender, but does not go far. The animal soon lies down and refuses to move. If left alone it may get up after some time and graze a little, but the appetite seems to be almost entirely lost. After the animal has been sick a couple of days it goes down. It may be down three or four more days, becoming weaker and weaker until coma sets in, when the beast lies on its side and death soon eventuates.

Salivation is commonly seen in the disease, and long strings of saliva hang from the mouth. In some cases the tongue is found to be slightly protruding from the mouth, and stockowners, on noticing the tongue in this condition and the animal salivating, have frequently examined the mouth expecting to find a bone stuck there.

The temperature and respiration appear to be normal, but the fæces are very scanty.

The animal does not seem to be able to drink, this really being due to paralysis of the throat. The lips are placed in the water, but the ability to swallow appears to be absent.

If a bush-bred beast is found down it appears to be quite bright in every way but cannot rise. If disturbed it makes frantic efforts to rise, but is quite unable to do so.

The disease usually runs a course of about five or six days. It may be as short as a couple of days or run into a fortnight.

Very few cases recover. The mortality must be well over 90 per cent., and it is doubtful if some of the cases which are stated to recover are really cases of the disease at all. One selector, who estimates his losses at over 500 head in the last five years, states that he has rarely seen a case recover, though he remembers one or two.

Post-mortem Appearances.

There are very few changes noted in making a post-mortem. A "quid" of grass is usually found in the mouth, lying between the teeth and the cheek, and may be extending right into the throat. The rumen or paunch is usually filled with foodstuffs, and the intestines usually appear normal. The last few feet of intestine contains several hard, mucus-coated pellets of dung. The bladder usually is empty.

Cause of the Disease.

The above is a brief description of the disease as it is found in North Queensland, and it is now necessary to discuss the probable causes. As stated previously, the disease appears to be identical with the Impaction Paralysis of Victoria, and a similar disease in other States. It is also probably allied to the Lamziekte of South Africa. The evidence in favour of such a conclusion is based on a study of the symptoms and post-mortem appearances, and on a history of the cases. The outstanding symptoms in Queensland are absence of temperature, paralysis of the alimentary tract (intestines, stomach, &c.), as shown by the inability to swallow, and the presence of a fair amount of foodstuff in the rumen, this not being passed on because of the paralysis, and in some cases by salivation and a protrusion of the tongue. This is followed by a paralysis of the limbs. These symptoms also

characterise the disease in other States. A further comparison between the two diseases will show that in Queensland, as well as in other parts, the disease occurs mostly on poor country *and where the bone-chewing habit is common among cattle.*

Research work has shown that the disease in Victoria and the Lamziekte of South Africa are both caused by bacteria, and there seems to be little doubt that, if the disease is ever made the subject of bacteriological investigation in Queensland, a similar cause will be found here. The symptoms and history of the disease all point to this being likely.

The particular bacteria causing Impaction Paralysis in Victoria belong to the group which cause "meat poisoning" or botulism. They are capable of producing very powerful toxins or poisons, which, if injected into animals, cause a disease similar to the natural disease. These bacteria have been isolated from the bones of animals which have died on the run, and the bone-chewing habit accounts for the manner in which they find their way into the systems of other animals, for, as before mentioned, the bone-chewing habit is very common where the disease is found.

Such, briefly, is the probable manner in which animals become infected. It must not be supposed, however, that all animals which die of this disease have the infection in their bones and carcasses, but all should be treated with suspicion, and it is possible that bones of cattle dead from other causes or even other animals dead on the run may be sources of infection. The toxin which is produced is absorbed from the bowel and becomes fixed in certain parts of the brain. It produces paralysis of certain nerves, especially those supplying the intestinal canal, and hence we have inability to swallow and a stasis of foodstuff in the stomach. Paralysis of the limbs follows.

Treatment.

Little can be done in the way of treatment. Nearly all cases are fatal. Statements have been made that bleeding saves many lives, though this is doubtful.

Acting on the assumption that infection is possibly caused by the chewing of bones of dead cattle, an attempt was made to clean up one selection by burning all the carcasses of animals that had died. The selection was only about 16 square miles, but, although small, it was some time before the place was even partially cleaned, seeing that over 500 head of cattle had died on this selection in about five years. The place, of course, will never be properly cleared, for it is hard to find all the bones of animals dead years ago in the patches of scrub, but an owner, who had been losing two or three head regularly per week, now reports that he has lost only five head in the last four months. Suitable licks are now being supplied to the animals.

Regarding the burning of carcasses, it might also be stated here that another selector, living next door to the abovementioned selector and on similar country, has not lost one beast from this disease. The former has made it a practice for years to burn the carcasses of animals dead on the run, whereas the latter has never done so until recently advised. It is too early yet to predict success, for there may be other factors operating to minimise the mortality at present, but prospects are hopeful.

Conclusion.

(1) A hitherto unrecorded disease in cattle has existed in the Charters Towers District for some years.

(2) This disease appears to be similar in symptoms and post-mortem appearances to the Impaction Paralysis of cattle in Victoria, and to similar diseases in South Australia and in Tasmania, and South Africa.

(3) As the disease in other parts has been proved to be due to bacteria of the type which cause "meat poisoning," investigation is required to prove whether the disease has a similar cause in Queensland.

(4) Acting on the assumption that the disease is probably caused by the animals chewing bones in which the bacteria produce their poisons or toxins, a commencement has been made by burning all the carcasses and bones on the affected runs and supplying lime to the animals in troughs. It is yet too early to state whether these measures will be successful.

(5) The mortality caused by this disease has been serious in the past. One selector reckons his losses at 500 head, and another, adjoining, at least 300 head, in the past five years. This mortality has been about equal to the natural increase, while deaths are undoubtedly occurring in other parts due to the same condition. The loss of one or two head out of a herd every few days reaches alarming figures when the aggregate is compiled.

FRUIT FLY INVESTIGATIONS.

PROGRESS REPORT OF THE GOVERNMENT ENTOMOLOGIST AT STANTHORPE.

The Minister for Agriculture and Stock (Hon. W. N. Gillies) has made available the following report of the Entomologist in charge of Fruit Fly Investigations at Stanthorpe, Mr. Hubert Jarvis, for the months of February and March, 1923.

FRUIT FLY.

Spraying Experiments.

The continuous dry weather during the month of February proved unfavourable to fruit fly development, as was shown by the very marked decrease in infestation by it throughout this period, and the latter part of January also. Although the spraying experiments have been continued, with both Malley's Arsenate of Lead, Poison Bait spray, and also with Arsenate of Soda spray, the results obtained by me have been by no means conclusive, as the apparent immunity from attack of trees sprayed has been shared also by trees unsprayed; and this, even in relation to fruits very attractive to the fruit fly, such as "Pullers Cling" peach.

Many orchardists, however, claim the very best results from the use of Malley's Arsenate of Lead Poison-bait spray, and this spray is certainly therefore well worth persevering with next season. The fruit juice used by many in place of a certain quantity of water (*i.e.*, about 8 gallons fruit juice with 40 gallons spray) renders the bait more attractive to the fly than if this is omitted, notwithstanding this, apparently good results have, however, been obtained without the addition of fruit juice. Although careful search has been made for dead fruit flies, and for other insects, beneath trees sprayed with arsenate of lead and molasses, no insects have so far been found by me in this situation. This would seem to indicate that this mixture is more in the nature of an attractive food-bait (especially where fruit juice is added) than a fly poison. In fact, the arsenate of lead being dense and insoluble sinks to the bottom of the application, leaving droplets of sweetened fruit syrup on the leaves of sprayed trees, and these, during rain, are washed away, whereupon the deposit of arsenate of lead remaining can readily be noticed. A good method for testing the potency of this or of any other bait as a fly-poison is suggested by Illingworth in his experiments in controlling the Apple Maggot in the United States of America. In this, cheese cloth is fastened to the ground with spikes, beneath a sprayed tree, and thus any insects which succumb through its use can be easily noticed on the white surface.

It cannot yet be stated definitely just what poison to apply and how to apply it, whether in the form of a spray, or otherwise; as the work being carried out in this district in this direction is as yet in its experimental stage. It has also been noticed that the fruit of trees (Pullers Cling Peach) well sprayed with the arsenate of lead and molasses bait, have been heavily infested with fruit fly maggots.

Trap Lure Experiments.

The only lure which has met with any real success is that known as "Harvey's Lure." This lure has undoubtedly proved of use in partially controlling the fruit fly, *C. tryoni*. Unfortunately, however, this lure varies considerably in its manufacture, some samples proving much more potent than others in attracting the fruit fly. "Harvey's Lure," as sold here in Stanthorpe, will undoubtedly catch both the male and female of the Queensland fruit fly, *C. tryoni*; one week's catch at Broadwater in four glass traps resulting in 198 fruit flies and another catch at Applethorpe from three traps totalling 210 fruit flies. In this latter instance, the traps had been set for five days.

Travelling of Fruit Fly.

One experiment was made to test the efficacy of "Harvey's Lure" away from orchard trees in bush land. Three traps, after being charged with the lure, were set in a strip of uncleared land, about 70 yards wide, between two commercial orchards. The traps were about 20 yards apart, and were baited freshly with Harvey's Lure each day for four consecutive days; one fruit fly only was caught; this fly was trapped on the fourth day, and was a female specimen of *C. tryoni*. In both orchards, the fruit fly was active, on the one side in quince, and on the other in late peaches.

Throughout this uncleared strip of bushland between the two orchards, the tomato fly, *Lonchea splendida*, was plentiful, and numbers were captured in each

trap. This experiment would seem to indicate that either the fruit fly does not travel very readily under such circumstances as these, or travels high up in the air. (This experiment will be continued.)

Eggs in Trapped Fruit Flies.

The number of eggs contained in female fruit flies trapped with Harvey's Lure varies too greatly to support the supposition that these flies are trapped prior to depositing their eggs on the fruit. It is, moreover, almost impossible with our present knowledge to state how many eggs a female fruit fly will lay, and over what period she will lay them. The life period of an adult fruit fly may be anything from one to six months, and even longer. Individuals have been kept alive by me for nine weeks, under unnatural conditions (*i.e.*, in the Laboratory), and there is no reason—in view of what is known regarding this class of insect—why a fruit fly should not live during the whole of the fruit season, and (in the case of female flies) oviposit at intervals during this period.

Activity of Fruit Fly.

The fruit fly, *C. tryoni*, was, on the 23rd March, observed to be ovipositing in late apples (var. Granny Smith) at Applethorpe. The fruit flies, resulting from the eggs so laid, will probably emerge about the middle of April. Several trees are being kept for experiment. The maggot-infested fruit will be allowed to fall, and the maggots enter the soil, which will then be netted in with fine gauze, or mosquito netting. A watch can thus be kept on fruit flies emerging during late autumn, or over-wintering as pupæ, if this should prove to be their habit. This will also be tried with infested fruit in the Insectary.

Experiments are also in hand to test the depth of soil through which the newly-hatched fruit flies will penetrate upwards in their efforts to reach the surface.

Seasonal Absence of Fruit Fly.

The adult fruit fly is undoubtedly absent from the Granite Belt during the winter months (*i.e.*, from May until October). The first record of the appearance of the fruit fly, *C. tryoni*, in fruit (cherries) in this district in 1922, was on 17th November. Prior to this happening, fruit flies emerged in this office on 8th November; these flies were bred from maggot-infested late Valencia oranges, imported into this district on 18th October. It seems reasonable to conclude that a large number of fruit flies were distributed by this means, at the date mentioned and even before, as oranges had probably been coming into this district for some time prior to the discovery here of their infestation. I am of the opinion that thus the fruit fly was given then a good start, so to say, at various points throughout the Granite Belt.

From more recent observations and experiments carried out, I am inclined to think—so far as the evidence yielded by them goes—that the fruit fly does not travel far (*i.e.*, long distances), and that our greatest watchfulness should be right here in our midst. We have as yet no definite knowledge of the distance, or distances, over which a fruit fly will travel, but we do know, only too well, how rapidly it will increase and multiply from a few individuals. I would, of course, hesitate to state that the fruit fly does not travel into the district by flight; but I am strongly inclined to think that our chief danger lies in its introduction by various mechanical means, such as the importation of infested fruit, from various centres, by fruit agents and by private individuals, but also by interstate passengers on the railway.

It will greatly facilitate the inquiry here if all fruit imported into this district is (as has been suggested by Mr. Tryon) subjected to a cold storage temperature for a sufficient length of time to destroy the eggs and larvæ of the fruit fly, thus obviating all danger of fruit fly introduction by this means. The importance of care and watchfulness with respect to fruit and possible fruit fly occurrence during the months of September, October, and November cannot, in my opinion, be overestimated. A very careful inspection of every orchard in the Granite Belt area, should, particularly at this time (during the months stated) be maintained.

Packing Sheds.

A prolific source of breeding fruit fly, and one that is generally overlooked, is the "packing shed." Hundreds of maggots escape unnoticed from fruit (stored while awaiting market) and pupating in all sorts of cracks and corners, soon emerge as adult fruit flies; access by these to the orchard is generally very easily obtainable through many openings, generally present in packing sheds, and the process of its infestation goes on continuously. All fruit so stored should be shifted at least once a week, if not oftener, and all rubbish, &c., brushed up and burnt.

OTHER INJURIOUS INSECTS.

(1) Timber Borer (Diadoxus sp.).

Investigation into the cause of several fine ornamental trees of the Cyprus family dying at the Summit brought to light a boring insect associated with these trees, and probably (if not the primary injurious agent) aiding in the work of destruction.

This boring insect is a beetle of the family *Buprestidæ*, Genus *Diadoxus*. The larva or grub is about ¾ to 1 inch in length and much flattened in shape, the first segment bearing the head and strong cutting jaws being very much broader than the remaining body-segments. The beetle is about ⅝ inch to ¾ inch in length, elongated in shape. The general colour is black, broadly marked with pale yellow across the wing-cases, the under surface having a greenish tint, very noticeable when the insect is alive. The damage is done principally by the larva, which tunnels the sapwood first beneath the bark (sometimes completely girdling the tree) and finally boring a tunnel deep into the wood, in which to pupate. The mouth of the tunnel is filled with tightly-packed chewed fragments of wood through which the beetle on emerging eats its way to the open air. The native host tree of this beetle, in the Stanthorpe district, is the Black Cyprus pine (*Callitris calcarata*). This beetle has not, to my knowledge, been found attacking any orchard tree.

(2) Cabbage Moth—Plutella cruciferarum.

This little moth commonly known as a "cabbage fly" has this season caused serious loss to cabbage growers. The moth itself is about ⅝ of an inch across the wings, and so slender in build that it is often mistaken for a fly. The moth lays its eggs on the cabbage in some crevice on the leaf, or against a leaf vein, and on hatching from the egg the tiny green caterpillar at once commences to feed on the leaf surface, soon eating a small hole in the leaf-tissue; when full fed, it spins a silken bag or cocoon of rather open texture on the leaf; within the silken shelter the caterpillar turns to a pale yellowish brown chrysalis, which, in due time, gives rise to the moth. Wherever the cabbage is grown in any part of the world, this little pest soon makes its appearance. It is a very difficult insect to control, and all recommended arsenical sprays, such as Paris Green and Arsenate of Lead, &c., have failed to really control it, nor have nicotine mixtures proved effective. Early spraying, continued at weekly intervals during the first six or seven weeks of growth, with combined spray of Arsenate of Lead and Bordeaux mixture (copper sulphate and lime) might give good results. Trapping the moths at night by means of a hurricane lamp placed in a shallow tray of water to which a small quantity of kerosene has been added is helpful, and hundreds are sometimes thus caught. Experiments with various repellent substances are being tried, but no definite results have yet been secured.

PLANT PATHOLOGY.

By no means least among the trouble affecting orchard trees and vegetables are the various diseases of a pathological nature.

"Tomato wilt" has this season caused a great amount of damage and loss to young settlers. This disease, the cause of which is unknown, is at present under investigation by the Government Pathologist and Entomologist, Mr. H. Tryon.

A fungus disease, closely related to Armillaria, is responsible for serious loss among peach and plum trees in various parts of the district. Specimens exhibiting this disease are being forwarded to the officer named for identification.

SUGAR: FIELD REPORTS.

The Director of the Bureau of Sugar Experiment Stations (Mr. H. T. Easterby) has received the following report, under date 20th April, 1923, from the Entomologist at Meringa, Mr. Edmund Jarvis:—

The Lower Burdekin During March.

A trip was made this month to the above district, Ayr being reached at midday on the 14th. The Secretary of the Pest Destruction Board, Mr. W. M. Saxby, introduced me to Mr. C. R. Crofton, president of the Shire Council, Messrs. A. H. Land, W. H. Ferguson, and other prominent growers, to whom I am indebted for cordial co-operation and, in some cases, hospitality received. Owing to the interest taken in this investigation we were able to travel over a considerable tract of

country, visiting Kalamia Mill, Rita Island, Pioneer, Jarvisfield, Seaforth, and part of Maidavale. On the evening of 16th instant, by request of the association, I delivered an address in the Ayr Shire Hall on "Control of the Grey-back Cane Beetle," which was followed by general discussion regarding those cane pests causing trouble at the present time on the Burdekin, in order that growers might have an opportunity of asking any questions occurring to them in this connection.

Effect of Drought.

The long continued dry weather has very seriously affected many plantations, the stools on which, although only 3 to 5 feet high, have turned yellowish-brown, while in some canefields the plants are already dead, or else too far gone to recover. In contrast to these drought-stricken areas it is refreshing to note the numerous stands of irrigated cane, displaying varying shades of rich green, which at present (14th March) are 6 to 8 feet in height.

The water used for irrigating purposes lies quite near the surface, often from 9 to 15 ft., and is obtained by putting down "spears," viz., iron pipes, the sides of which are pierced with ½-in. holes at distances of a few inches apart, these being covered by an outside sheathing of wire-gauze to prevent any larger particles of soil that might otherwise clog the pipe from being sucked into it.

The water is raised by a centrifugal pump to a height corresponding with that of the highest point on the land to be irrigated, and from thence conveyed to the plantation by an overhead fluming; or, if the ground be nearly level, is simply pumped into a deep channel cut along the highest headland. Many growers are of opinion that it does not pay to grow cane on the lower Burdekin unless provision be made for irrigation during dry seasons.

Ratoon Crops.

Some growers are in favour of doing away with ratoon crops altogether, believing that heavy plant crops, when forced by irrigation, have an exhausting effect on the soil, unfitting it, in fact, for an immediate production of vigorous ratoons. Possibly the leaching of certain plant-foods on much-irrigated areas might gradually impoverish such cane land. It has been noticed, too, that grubs usually do more damage to ratoons than to plant cane. Doing away with the former would mean more frequent and uniform cultivation of the soil as a whole, which, in itself, tends to increased fertility. Again, it would afford better opportunity for combating the grub pest by means of such methods as poison-baits dropped in planting drills, collecting of the grubs, &c. Further, the percentage of grub-infestation on a plantation is generally revealed when ploughing out a crop, and thus the grower being forewarned would have ample time, if necessary, to take action for control of the pest before grubs became large enough to do damage.

However, if deciding on the other hand to grow ratoons, weakly crops could, if desired, be manured in the usual way. I cannot advocate too strongly stirring of the surface soil at short intervals during the egg and first larval stage of the beetles.

White Ants Attacking Sugar-cane.

This pest appears to be working injury second only in economic importance to that caused by the grey-back beetle.

Strickly speaking, the insect in question is a termite, of larger size, however, than any occurring in the Cairns district. It tunnels in living cane-sticks, often completely devouring the interior above ground, leaving only the rind. Even when canes are bored throughout their whole length the heart-leaves at first often manage to keep green for a time, but in final stages of injury the stick dies, and when cut open is seen to be merely a hollow pipe.

Unfortunately, this pest has established itself on land that has been under cane for twenty years, so that its presence cannot be attributed altogether to the occurrence of old tree-stumps or roots, although these might in the first instance have harboured colonies of the termites. Mr. W. Payard, of Brandon, told me he lost two-thirds of a crop of Badila through ravages of white ants on an area of 18 acres, from which he finally cut 200 tons instead of the estimated yield of 600 tons. It seems he got rid of them at one time by sprinkling around their nests a bait composed of molasses and arsenic, which proved so effective that two flour bags could easily have been filled with their dead bodies.

Mr. Payard has remarked that the so-called "Soldier Ant" (*Irid-omyrmex* sp.), a very active pugnacious species which nests underground, destroys these termites, which are never found in the immediate vicinity of its communities. I was interested to observe in this connection that some termites occupying an infested cane-stick which was carried to my hotel at Ayr, were quickly discovered and attacked by a common little black ant (*Pheidole* sp.) This insect would, I feel sure, help us very materially to combat the insect in question (*Mastotermes darwiniensis* Frogg.) if introduced freely into affected canefields. This could be very simply accomplished during the flighting time of Pheidole in the rainy season while swarming of the winged males and females is taking place. In our own district, which is nearer the seaboard, these useful little ants have already obtained a footing in most cane areas, where they operate as a natural controlling factor against both the weevil-borer and large moth-borer of cane. Fumigation of the ground with carbon bisulphide, after clearing off and burning all affected cane, would destroy these termites in a wholesale manner, and at the same time by killing injurious soil bacteria improve the fertility of the land.

With a view to efficiently controlling this pest we are at present experimenting with poison baits, using for this purpose living specimens of white ants brought from the Burdekin.

Large Moth-borer.

Rita Island was visited on 16th instant, this being the locality where caterpillars of the borer (*Phragmatiphila truncata* Walk.) have been very much in evidence during past seasons. At the present time, however, little damage is being done, it being the early broods of this moth emerging from May to July that cause the chief damage. I was interested to learn from Mr. Cody that he had noticed caterpillars, which he believed to be those of truncata, boring the somewhat thick stems of "Cat-tail" grass. After a short search specimens of this grass-borer were found, but when subsequently examined proved to be those of a lepidopterous borer that does not affect sugar-cane.

As it was the wrong time of year, I was unable to obtain data regarding the possible occurrence on Rita Island of the parasite of truncata (*Apanteles nonagriæ*), a useful little braconid wasp which effectually controls this moth-borer in the Cairns district.

As a general rule, which quite possibly may hold good in the Lower Burdekin district, damage from large moth-borer seldom extends throughout the growing period, but gradually disappears when the cane is about half grown. Occasionally, however, the tops of mature sticks are bored, although not always in such manner as to cause dead-heart.

Cane Grubs.

These occurred in patches on some of the irrigated areas. On Mr. A. H. Land's selection, for example, several fine stools of cane were seen to be falling over from the effects of grub injury, the main feeding-roots having been severed, so that one could pull up a large stool with little or no exertion. The soil here was an almost black, sandy loam—ideal cane land I should say—and grubs unearthed by us were working at a depth of about 6 in. The average number obtained per stool was four, most of them being in the third stage. These large grubs are apparently those of the common grey-back cockchafer (*Lepidoderma albohirtum*); but, curiously enough, the disposition of the small stout bristles bordering the anal path differs very noticeably from the arrangement of these characteristic setæ on the anal segment of grubs of our grey-back of the Cairns district. Probably when reared to the beetle stage we shall find the Burdekin grey-back to be a variety of albohirtum, constituting, perhaps, a distinct race, which may possibly owe its origin to soil variation, environment, rainfall, and other climatic influences.

Other grubs noticed were those of the "Christmas beetle" (*Anoplognathus boisduvali* Boisd.)—termed "Gold beetle" on the Burdekin, and probably the same insect as that called "Golden beetle" by Herbert River growers—and "red-head" grubs (*Dasygnathus australis dejeani* Macl.), a cane pest of minor importance, subsisting mainly upon humus in the soil. Additional species of scarabaeidæ not yet recorded as affecting cane, occurring in this district are *Anoplognathus frenchi* and *Calloodes grayanus*, the former—which must not be confused with *Lepidiota frenchi* of our canefields—being of a uniform brilliant metallic gold colour, while grayanus, a much larger species, is dark lustrous green edged with a marginal band of golden brown.

Control Measures for Grubs.

The mechanical nature of the Burdekin soils, together with the dry weather conditions, often experienced in this district at a time when grubs are too small to materially injure the cane (February to April, during which months the average rainfall is 19.55 as against 44.78 in. during the same period in the Cairns district), point to the advisability of using soil fumigants as being the controlling factor most likely to prove effective. As far as we know at present, carbon bisulphide would meet all requirements. A few days after treatment, when the grubs were dead, the plantation could, if necessary, be irrigated with every certainty of securing a good crop. Experiments in hand with Para-dichlorobenzene indicate that this fumigant, if applied to the a week or so before flighting of the beetles, would very likely prove an efficient deterrent, it being highly improbable that egg-laden females would enter or lay their eggs in ground contaminated with an odour that would prove fatal to their offspring. Such treatment could be applied during October, before emergence of the beetles, this month being usually a dry one in the Ayr district (average precipitation 0.89 in.), which would allow time for the fumes of Para-dichlor. to spread freely in all directions.

Upon appearance of the beetles, which I presume generally emerge in November, this being the wettest month (average 12.26 in.), treated areas would still continue repellant, as ½-oz. injections of the crystals of this fumigant do not evaporate completely until five to seven weeks after application, and even after this has taken place the soil retains the odour for about three weeks longer.

Natural Enemies.

The only species noticed during my visit was a larval specimen of the "Skip-jack" beetle (*Agrypnus mastersi*), which is predaceous upon grubs in the soil, the ground being exceptionally dry, and flowers very scarce. Mr. J. McElroy, however, told me he had often observed small wasps—which from his description I took to be males of our *Campsomeris* digger wasps—flying erratically close to the surface of the soil on cane land.

The digger wasps we are hoping to introduce very shortly from Java should prove serviceable in the Burdekin district, since the host-grubs parasitised by them in Java inhabit chiefly sandy-loam soils.

Collecting the Beetles.

With regard to collecting cane-beetles, about 6,000 quarts, principally grey-backs were paid for last season at the rate of 1s. 6d. per quart. Collecting was commenced in the middle of December, finishing up about the end of February. During last season, grubs in the Kalamia Mill area alone destroyed between 5,000 to 6,000 tons of cane. The manager, Mr. A. C. Park, thinks March is the best month in which to plant; but one cannot always be sure of the weather at that time of year. Cane is planted here mostly in May, June, September, and occasionally early in October. Mr. Land has had good results from using tops of cane planted in May.

Feeding Trees.

The chief food-plants of the grey-back cockchafer are said to be Moreton Bay fig (*Ficus macrophylla*), rough-leaved fig (*Ficus opposita*), and Moreton Bay ash (*Eucalyptus tessalaris*).

Cane Disease.

Badila cane affected by a disease apparently identical with that commonly known as "Top rot" was noticed on land belonging to Messrs. Holson and Tapolium.

This trouble seems to develop chiefly during hot weather, from February to March, often after heavy rain. The percentage of damage caused by it varies very considerably (in the present instance less than 10 per cent.). In stools harbouring the disease injury is generally confined to one or two sticks, which, strangely enough, may often be observed growing side by side with healthy canes. In advanced stages of "Top rot" the central core and heart leaves die, and when pulled out the decomposing basal portion has an offensive smell.

Up to the present this malady has received little investigation. It is said to be caused by a parasitic fungus, which it is assumed gains entrance to the plant through its roots.

Conditions favourable to development of "Top rot" are supposed to be—(1) defective drainage; (2) heavy rain during the first two or three months of the year; (3) late planting, should this chance to be followed by climatic conditions conducive to the disease; and (4) planting of varieties of cane known to be susceptible to "Top rot."

The Director of the Bureau of Sugar Experiment Stations has received the following report, under date 17th April, 1923, from the Southern Field Assistant, Mr. J. C. Murray:—

Farleigh.

At the time of inspecting this area the country was very dry, although since then fair rainfalls have occurred, though not enough as yet to give the growth sufficient impetus to yield a big crop. Numbers of farmers were planting, while others were hanging back waiting for moisture. The ground was, on the whole, in fair condition, and under the circumstances most farmers could have gone ahead with planting with a probability of a fair strike.

Cane varieties doing well are Q.813, H.Q.426, M.189, Ubo, Shahjahanpur No. 10, 1900 Seedling, B.147, N.G.16. N.G.15, H.Q.426, and Q.813 are making the best showing all through. Shahjahanpur No. 10 is doing well; in fact, this variety on a piece of rich soil is showing 7 feet of cane, and farmers would be well advised to persevere with it. Shahjahanpur No. 10 does not require a rich soil, usually doing very well on a good grade forest loam. Its immunity from frost is another factor that should commend the variety to growers on low-lying soils. Farmers are advised, when they first get this cane, to plant it on their best soil until it gets used to the land, and always adopt careful plant selection. If they do this they will find planting Shahjahanpur profitable.

Growers here are advised to go in more for green manuring; also, especially on the older soils, the use of maize as a rotation crop. They are also advised to make use of existing facilities for getting soils analysed.

Netherdale.

The cane in this area looked greener probably than any other place in the Mackay district. The land, generally speaking, has only been growing cane a short time, and consequently retains much of its virgin richness. Both scrub and forest land are mostly first-class soils, although not always accessible to the plough.

Cane varieties doing well in this district are Q.855, Q.813, Q.1121, D.1135, N.G.15, H.Q.426, and Q.970. On scrub land Badila (N.G.16) is making the best showing; but on forest soils Q.970, 813, and 855 are making excellent progress. Q.855 looks particularly well, showing in some cases hardly any sign of deterioration after the long dry spell. This variety is stooling well, with cane of good length and thickness. Q.970 also on present appearances should commend itself to growers on forest soil. Q.813 is also making an excellent showing.

Farmers are recommended to try E.K. 1, E.K. 28, and Shahjahanpur No. 10, also "Pompey."

Rainfall in the Netherdale area is probably more regular than any other of the Mackay areas. Farmers are advised to green manure as much as possible, thus preventing the soil from gradually getting poorer as time goes on.

Samples were taken from typical soils in this area, and the results of their analyses will apply fairly generally. The cane is healthy and free from pests. Grub infestations are not serious. Growers are reminded that careful plant selection is a big factor towards success.

Pinnacle.

Cane on this area has been checked, but not seriously so, by the dry weather. There should be a fair crop, unless an absolute drought strikes the district until, say, the end of April. Badila is making a good showing on the Pinnacle plains, while in other places Q.813, 1900 Seedling, D.1135, Q.970, and H.Q.426 (Clark's Seedling) are looking like cheque winners. Green manuring with cowpea is being more extensively used than hitherto. Farmers are advised to use lime in connection with this operation.

Cane pests are not causing loss at present, although on this area farmers suffer occasionally from grub infestation. Intensive cultivation is a big factor in checking the maturing process of the cane grub, as this destroys the natural habitat of the pest and retards its natural development towards the adult of the species.

In common with most other cane lands in Queensland, partially sterile patches of soil are found on many of the farms. The farmers are advised to cast animal manures on to these pockets if it is available, or try the effect of lime in proportion to the size of the sterile piece of land.

Down the river towards Gargett the cane looks green, but wants rain badly. Nut grass is a considerable pest to the farmer in this locality. Samples were taken for analyses from fairly typical Gargett and Pinnacle soils.

Marian.

This district, in common with the other areas, is suffering from want of rain. Cane here is seriously checked, but as light rains are falling now with considerable promise of continuance there should be a fair crop. There is not yet any need for undue pessimism. Excellent results have been obtained from the use of lime and green manures, and farmers are strongly advised to continue these operations.

It is probable the Q.813 is standing the dry spell as well as any variety. Malagache is suffering considerably, also 1900 Seedling. None has been stricken beyond recovery. Farmers are recommended to obtain and thoroughly test "Pompey," E.K.1, and Shahjahanpur No. 10. No serious loss is being incurred through cane pests.

A most important phase of farming on these Marian lands is sub-soiling, not inversion by deep ploughing, but disturbing the subsoil as deeply as possible to increase its capillary action in dry weather. This would greatly increase the resistance of the land during drought and, incidentally, produce heavier crops.

Walkerston.

The cane on this subarea is backward owing to the dry weather. Farmers, however, are busy cultivating and otherwise preparing for a moderately early planting. Varieties making a fair showing in face of the hard conditions are H.Q.426, Q.813, 1900 Seedling, D.1135, and M.187. Of these it is probable that D.1135 is showing the greatest hardihood. Q.813 is making a fair showing, although in one field a peculiar freakish growth of the top was noticed to be occurring fairly frequently through the cane. It appears to be the result of a shoot returning to vegetative growth after it had started to develop an arrow, and the result was a bunched and twisted top. There was no evidence of root-destroying fungi or nematodes. A big factor in causing the malformation has probably been the very adverse weather conditions.

Growers here are recommended to use green manures as much as possible, as the soil is deficient in humus. The average soil reaction is acid.

Mackay.

The cane immediately round Mackay has been severely checked by the dry weather. However, it will recover if downfalls of rain are not delayed too long. Most of the available land is planted, and some months back the crops looked remarkably promising for a heavy yield. Some of the farmers are busy breaking up and planting, but numbers are waiting for the weather to break.

Varieties holding out well include Shahjahanpur No. 10, Q.970, Q.1121, 7R.428 (Pompey), D.1135, and E.K.28. Of these it is probable that the firstnamed is showing the greatest resistance to dry weather conditions. This cane is also showing a strong degree of resistance to disease. 7R.428 or "Pompey) is showing excellent qualities, especially in the ratoons. Q.970 and Q.1121 require plenty of cultivation, and if this is carried out are very satisfactory varieties for this locality. E.K.28 is showing well, and with careful cultivation and plant selection should become a staple variety.

Summarising, the great drawback is want of rain. It is many years since the cane has had such a severe time. Areas outside the Pioneer Valley were more fortunate than those within the influence of the river in respect to showers so far fallen. Going into details, and being as brief as possible, the factors growers require to bear in mind are these—

Farleigh District.—Deeper cultivation and more green manuring; introduction and careful trying of new varieties; careful plant selection; and making greater use of the facilities provided by the Bureau for soil analyses.

Netherdale District.—Green manuring; careful plant selection.

Pinnacle District.—Liming and green manuring; careful plant selection; introduction and trying of new varieties.

Marian District.—Greater use of lime and green manures and facilities provided by the Bureau of Sugar Experiment Stations for soil analyses; careful plant selection and subsoiling.

Walkerston District.—Lime and green manures; analyses of soils and plant selection.

Mackay Area.—Subsoiling and green manuring; careful plant selection.

SUNSPOTS AND THEIR RELATION TO CLIMATE.

SEASONAL FORECASTING.—POSITION IN QUEENSLAND.

BY H. I. JENSEN, D.Sc., Geological Survey.

The last twelve months constitute the severest drought period Australia has experienced since 1900-1902. It is not Queensland alone which has suffered failure of wheat crops, dying stock, heavy losses of sheep and cattle, disastrous bush fires, and similar calamities, but every State in the Commonwealth has been more or less affected by drought.

The present drought commenced eighteen months ago in Europe, the provinces of the old Austrian Empire, old Russia, Transcaucasia, and Siberia being affected. The adobe soils of Samara and Odessa are like the lands of our Western downs and Maranoa, and have a similar climate. Droughts are periodic and unavoidable.

The past twelve months in England have been the driest for twenty years. The American wheat crop is deficient. The Nile has been the lowest for two decades. Drought conditions have been world-wide. Again this year there is a second famine pending in Ukraine and Southern Russia. Plague, that usually accompanies great drought, has made its appearance in Australia in spite of precautions; violent electrical storms have visited scattered places; heat waves have been experienced, and cloud-bursts in isolated places near the coast. All these phenomena are a repetition of what occurred between 1899 and 1902.

Stock losses have been reduced in Australia in the past year, as compared with 1901-2, through the greater abundance of artesian bores, and through the more extensive distribution of prickly-pear, and crop losses have been somewhat lessened through more scientific methods of agriculture. But the season has been a severe one for the man on the land, especially occurring in a period of artificially low prices for primary products, and high prices for manufactured goods.

It is obvious that if we know the cause of these periodic droughts of world-wide extent, and if we can forecast them with some degree of accuracy, we can prevent a great proportion of the loss and suffering resulting from them.

Drought and Sunspots.

In June, 1904, the present writer contributed a paper to the Royal Society of New South Wales on the subject of the interrelation of seismic and climatic phenomena with solar conditions. It was shown that periods of world-wide drought were synchronous with sunspot minima.

Climatic Cycles.

Jevons, the great English political economist and statistician, showed that Indian famines coincided with sunspot minima, and wheat prices fluctuated in close relation with the inverted sunspot curve.

Meldrum has shown that the number of severe cyclones in the West Indies is much greater in sunspot maximum than in minimum years, while Blanford has shown that the atmospheric pressure is greater over India in years of sunspot minimum than maximum.

Wolf, a German meteorologist, and later Bruckner, first showed that climatic cycles brought a return of similar conditions in three sunspot periods—thirty-three to thirty-five years—the Bruckner cycle. The investigations of Hann, the great Austrian meteorologist, have confirmed this. Dr. Rudolph Mewes and Professor Foerster, of Berlin, said that rainfall is greater in sunspot maximum years owing to the more excessive evaporation. Professor Schuster wrote: "The difference between the average temperature in years of maximum of sunspots and years of minimum amounts to as much as 0.73 degrees C. in tropical, and over 0.5 degrees C. in extropical regions." Carpenter and Balfour Stewart found that "sunspot inequalities, whether apparent or real, seemed to have nearly the same periods as terrestrial inequalities, as exhibited by the daily temperatures of Toronto and Kew." Alex. McDowall, another well-known British meteorologist, contends that rainfall in Britain varies with the sunspot curve. Spectroscope observations in India by Blanford, Roscoe, and Balfour Stewart show that the radiation of heat from the sun is greater at sunspot maxima than at minima.

The close connection between terrestrial magnetism and solar changes was shown by Ellis, in Phil. Trans. 1880. He found that the diurnal ranges of the magnetic elements of declination and horizontal force are subject to a periodic variation, the duration of which is equal to that of the eleven years sunspot period. Violent solar disturbances are reflected in violent magnetic distrubances on the earth, accompanied by auroral displays.

The Cause of Sunspots—A Probable Theory.

Sir Norman Lockyer contended that sunspots are the result of the falling in or condensation of large volumes of cool metallic vapours of the sun's atmosphere, which form the beautiful and extensive corona that is always present round the sun in minimum years. This is a probable theory. However, it is a proven fact that there is a much more vigorous circulation of the sun's atmosphere, and consequently greater evolution of heat and electrical waves, when the spots are plentiful. Therefore, more heat and energy are radiated into space. The earth and the other planets receive more heat and energy, some of which possibly transmute lead and other minerals into uranium and radium to disintegrate later under different conditions. The earth radiates less heat into space in maximum years; consequently, evaporation is greater, climates are more equable, crops are better, the atmosphere circulates more vigorously, the moisture-laden clouds are carried further inland, and precipitation of rain is more general. A mean difference of 5 degrees C. between the average atmospheric temperatures of maximum and minimum years can account for enormous evaporation and climatic difference.

Position Reviewed.

We can now see that it is no mere coincidence that the years 1811-12, 1844-46, 1864-69, 1896-1902, and 1922 were years of severe world-wide drought. These are all sunspot minimum periods. The Nile in 1902 was the lowest on record, but this year it was nearly as low. The year 1901 was exceptionally dry in Siberia, as John Foster Fraser recorded in his travels there that year (''Real Siberia,'' p. 148). So also were the sunspot maximum years 1864, 1870-71, 1893-96 years of wet seasons in most parts of the world. The Rothesay rainfall records, the most complete in the world, show the greatest droughts to have occurred in 1822, 1855, 1887, sunspot minimum years.

Heavy rain squalls and cloudbursts occur at scattered coastal places and on oceanic islands in years of sunspot minimum. The moisture-laden clouds and the cyclonic disturbances originating over the ocean break and dissipate before the central portions of the continents are reached. Mauritius generally has the driest years when India has its wettest. Glaciers advance most in years of sunspot maximum, and retreat in sunspot minimum. Very little snow fell on Mount Kosciusko in 1902.

The Drought Question.

Red rain, fireballs, violent electrical storms, intense duststorms, and such phenomena are characteristic of sunspot minima, as are also heat waves and cold waves.

In a highly mobile fluid like the atmosphere many anomalies occur in rainfall which makes seasonal forecasting for any individual place a practical impossibility. Heavy rains occur at times in England when we are still suffering drought in Australia. But that is readily understood when one takes into consideration that England is insular, and high mountains such as those of Scotland, like the Rockies of North America and the Andes of South America, also cause cyclonic disturbances to be drawn inland even in sunspot minimum years when regions like Australia, the Deccan, South Africa, and Siberia and Russia, which have no ''chimneys'' to create a draught, are drought-stricken as long as the sunspot minimum lasts. It has also been noticed that droughts commence a year or so earlier in the one hemisphere than in the other, the position of the moon north or south of the equator accounting for this phenomenon.

The drought of the present year came a season earlier in Russia than in Australia. We are not done with it yet. The recent rains are very cheering, but entirely insufficient. To be forewarned is to be forearmed. A small and erratic rainfall cannot produce grass in sufficiency.

There seems to be little hope of science ever being able to achieve exact seasonal forecasts for small districts. The best that astronomy can yield is a general continental forecast giving an indication of the class of season to expect. This should, however, be a great aid to agriculturists and pastoralists.

Possibility of Forecasting Earthquakes.

Owing to the mobility of the atmosphere small causes, often produced by the acts of man, a bush fire, a clearing of virgin scrub, or something such, frequently cause an abnormal season for the environment.

Forecasting earthquakes and eruptions may become a practical possibility. Since solar influences in this case affect the earth's crust, an immobile medium, the effects can be foretold. But in the atmosphere minor causes bring about great variations.

Nor will it ever be possible by human agencies to make bad seasons good, or *vice versâ*, though man may be able to modify somewhat the severity of a drought in coastal districts by explosive or electrical agencies. Wragge's Styger Vortex guns were a failure, but the experiment was worth trying; and, in view of the heavy rainfall caused by artillery cannonade on battlefields, possibly the same experiment on a larger scale in a coastal district might have brought copious rain.

Hertzian waves and other electrical waves may also eventually prove useful. Further experiments on rain-making should be tried, and some good will probably eventually result, if it can only save coastal agricultural districts from severe drought.

BRITISH EMPIRE EXHIBITION.

Meeting of Agricultural, Viticultural, and Horticultural Group Committee.

The unique opportunity offered by the British Empire Exhibition to make more widely known the agricultural products and resources of Queensland is being fully seized by the Department of Agriculture and Stock, and at a meeting of the Agricultural, Viticultural, and Horticultural Committee of the Queensland State Commission of the British Empire Exhibition, held at the Head Office early in the month, plans for complete presentation of exhibits were advanced.

Attendance—

H. C. Quodling, Chairman (Director of Agriculture);
E. W. Bick (Curator, Botanic Gardens);
W. G. Wells (Cotton Expert);
H. W. Mobsy (State Organiser);
H. T. Easterby (Director, Sugar Experiment Stations);
W. G. Brown (Sheep and Wool Instructor);
J. Ward (Fruit Instructor); and
H. Hunter, Secretary.

A lengthy agenda paper had been prepared, and at the outset of the meeting the State Organiser (Mr. Mobsby) submitted his progress report. Included among the subjects dealt with were—

1. Allotment of Space for Agricultural Exhibits.

The plan of floor space submitted to the Federal Commission by the Victorian Government allowed for a total floor space of 5,436,794 square feet for all industries. Queensland's proportion of that space was 14 per cent., or in other words 757,634 square feet. There had been allotted to all States for agricultural displays a space of 18,736 square feet, and Queensland by its 12 per cent. share had at its disposal an area of 1,920 square feet.

In the plan as it stands at present Mr. Mobsby has suggested several alterations.

First of all, the original plan provides that the Wheat and Wool Trophies shall be situated right up to the front door of the building, but Mr. Mobsby's suggestion is that the Wheat Exhibit should go along with the Agricultural Exhibit, and the space so rendered vacant be occupied by an Information Bureau. As a further suggestion the Wool Trophy should be included in the Pastoral Section, and its present allotted space occupied by Trade Bureau Section. To these suggestions the Committee gave its concurrence.

2. General Character of Sectional Displays.

Discussion on this item was turned to the question of labelling exhibits. The Committee, after having given much consideration to this matter, were unanimously of the opinion that a uniform label should be adopted by all States, and it was suggested that each label should bear an outlined map of Australia showing the divisions of the several States; and the name of the exhibit should be printed on this map in lettering coloured to represent the State presenting same. The Committee delegated upon Mr. Mobsby the duty of preparing such a label for consideration by the Federal Commission.

3. Finance.

The Chairman asked each member present to furnish an approximate cost for the collection, delivery, storage, preparation, and display of the various commodities included in the Agricultural, Viticultural, and Horticultural Sections.

4. Exhibits—Collection and other Activities.

(*a*) *Wool.*—Whilst dealing with the Wool Exhibit a motion was passed to the effect that inquiries should be made of the Queensland State Commission as to the space allowed for Queensland in connection with this exhibit, and what quantity and class of wool was required, so that active steps could be taken to have a suitable exhibit procured.

(*b*) *Cotton.*—In view of the importance of Cotton to the Empire, a resolution was passed to the effect that provision be made for a representative display of Cotton in the Agricultural Section, and also that a Cotton Display be provided for on the wall space in close proximity to the Cotton Trophies. Mr. Wells promised to take up the matter of a suitable Queensland Cotton Display with the British Australian Cotton Association.

(*c*) *Sugar.*—Mr. Easterby promised to collaborate with the Colonial Sugar Refining Company and the Australian Sugar Producers' Association in connection with a suitable Sugar Exhibit.

(*d*) *Cereals.*—The Department of Agriculture has at present a large and representative collection of Queensland cereals, but provision will be made to have further specimens of this year's grain secured.

(*e*) *Grasses and Edible Shrubs.*—Whilst on this exhibit a motion was passed that the matter of the display of grasses and edible shrubs be brought up at the next meeting of the representatives of the Agricultural Departments, to be held in Sydney this month, and that consideration be given to the display of grasses on screens made to suit the design.

(*f*) *Fresh and Dehydrated Fruits.*—Mr. Ward expressed the opinion that a suitable and representative exhibit of dehydrated fruits could be obtained from the Dehydration Company now in operation at Nambour.

Pastoral and Refrigerated Products Committee.

The inaugural meeting of the Pastoral and Refrigerated Products Committee connected with the Queensland State Commission of the British Empire Exhibition was held at the Department of Agriculture and Stock, William street, on Thursday, the 26th ultimo.

The committee consists of the following members representative of the several industries comprised within this section, with Mr. E. Graham (Director of Dairying) as chairman—Messrs. R. H. Edkins and E. F. Summers (Pastoral, Frozen Meats and Meat Products); W. T. Harris, E. Turrell, and R. McWhinney (Dairying); A. H. Benson and W. Ellison (Fruit); J. Beard and W. Hindes (Poultry, Game, &c.); W. H. Mobsby, State Organiser; and M. L. Cameron, Secretary.

Space Allocation.

The committee reviewed the matter of space allocated tentatively by the Federal Commission, and it was decided that some slight modification, which would not interfere with the aggregate area of space, could be effected beneficially by common arrangement with the representatives of kindred industries in the other States.

Exhibits.

The committee discussed the procuration and arrangement of exhibits, and decided that the members of the committee should endeavour to collaborate with other representatives of the industries with a view to securing the produce necessary for the Queensland section of the forthcoming Empire Exhibition.

Several of the committee expressed the desirability of manufacturers being alive to the advantages of arranging, through the ordinary channels, for the supply of these commodities for consumption by those attending the Exhibition.

WIRE WORM IN SHEEP.

The subjoined article, abstracted from the Journal of the Department of Agriculture of the Union of South Africa, deals with the life-history of the wire worm of sheep, or stomach worm as it is known in Queensland, a parasite common enough here in many parts of the State and occasionally responsible for heavy losses, especially in lambs. In this connection Mr. John Legg, B.V.Sc., M.R.C.V.S., Government Veterinary Surgeon at Townsville, writes—

The life-history of this parasite (or *Hæmonchus cortortus* in scientific language) has been extensively studied by the Veterinary Research Staff of the South African Government, and an elaborate series of experiments with single drugs and with mixtures of drugs has revealed the fact that a combination of Sodium Arsenite and Copper Sulphate is the most effective medicinal agent that can be used in killing and removing this parasite from the digestive system of the sheep. It is this combination which is referred to in the article, and which has been repeatedly found on experiment to kill 100 per cent. of the adult parasites in the stomach.

The medicine is put up in tins, each containing 100 doses for adult sheep, and a series of graduated spoons is supplied, each holding exactly one dose for sheep of various ages. It may be given in the powder form by simply placing it on the back of the tongue with the spoon, or it can be dissolved in water with the addition of a little hydrochloric acid, and the liquid given as a drench or simply squirted into the mouth with a hypodermic syringe minus the needle. One hundred doses can be dissolved in a litre of water, with the addition of about 14 c.c. of hydrochloric acid, making the dose for one adult sheep 10 c.c. The doses are as follows:—

In Powder Form.

No. of Notches on Spoon.	For use on—	Quantity of Remedy.	Total.
One	Lamb, 2 to 4 months old	Sodium arsenite 36 mg. .. .. Bluestone 144 mg.	180 mg.
Two	Lamb, 4 to 6 months old	Sodium arsenite 50 mg. .. .. Bluestone 200 mg.	250 mg.
Three ..	Lamb, 6 to 10 months old	Sodium arsenite 75 mg. .. .. Bluestone 300 mg.	375 mg.
Four ..	Sheep, 2-tooth ..	Sodium arsenite 100 mg. .. .. Bluestone 400 mg.	500 mg.
Five	Sheep, 4-tooth and older	Sodium arsenite 125 mg. .. .. Bluestone 500 mg.	625 mg.

mg.—Milligrammes.

In Liquid Form.

For use on—	Quantity of Mixture.
Lamb, 2 to 4 months old	3 c.c.
Lamb, 4 to 6 months old	4 c.c.
Lamb, 6 to 10 months old	6 c.c.
Sheep, 2-tooth	8 c.c.
Sheep, 4-tooth and older	10 c.c.

c.c.—Cubic centimetres.

The results which have been achieved in South Africa in suppressing this parasite and the interest it has for many Queensland flock-owners, together with the experimental evidence which indicates the superiority of these drugs over all other combinations, would seem to warrant a testing of this medicinal agent under Queensland conditions.

THE LIFE HISTORY OF THE WIRE WORM OF SHEEP.

Introduction.

The wire worm of ruminants, scientifically known as *Hæmonchus contortus*, is a small thin worm which passes part of its life in the "fourth stomach" of sheep, cattle, goats, and other ruminants, including wild game such as buck. Its distinguishing scientific name "contortus" is given to it on account of the contorted or spiral appearance of the internal organs of the female. In the adult form the white ovaries of the female are rolled round the reddish intestine to form regular loops, and this gives it a spiral striping like a barber's pole. It lives by sucking blood from the mucous membrane, and from this blood its intestines derive their colour.

Post-mortem examination of an infected sheep shows the presence of the adult worms, rather over an inch in length and about as thick as an ordinary sewing needle. They are found either wriggling about in the stomach (abomasum) or in clusters round the stomach walls.

The general symptoms of acute wire worm infection are inflammation of the stomach and anæmia. This shows itself externally as a paleness of the mucous membranes of the mouth and eyes, loss of flesh and general weakness, accompanied by thirst, diarrhœa, and sometimes by a dropsical effusion (or watery swelling) under the jaw.

Lambs and young sheep are most seriously affected, but although fully-grown sheep also suffer they can sometimes harbour the worms for a long time without showing serious symptoms, provided the veld is in good condition and they obtain abundance of good food. Such *apparently healthy* adult sheep are a serious source of danger, since they keep the infection alive and, in their droppings, scatter eggs to infect the veld, and hence infect the rest of the flock.

There are six stages in the life-history of the worm—the egg, four "larval" or immature stages, and the adult. Half of these stages is passed in the stomach of the sheep, and the other half outside on the veld. The complete life-cycle may be indicated as follows:—

Adults.

Fully-grown males and females only live in the fourth stomach of sheep and other ruminants. Here they may thrive all the year round, although the degree of infestation depends upon the season. Once a sheep is infected with wire worms it may remain infected for a very long time unless measures are taken to eradicate the parasite.

The female is somewhat larger than the male, and is readily distinguished by the enlargement over the hind third of its length, corresponding to the egg-laying organs. When full size has been reached the average length is about 1 inch, and the average breadth about one-fiftieth part of an inch. The females are then fertilised by the males, and egg-laying begins.

Eggs.

The eggs then leave the stomach along with the food, pass through the intestines, and out with the droppings. The eggs are oval in shape and very small; only about one-four-hundredth part of an inch in length. The number which can be passed out by a badly infected sheep is enormous, and even an infected sheep which is still outwardly healthy in appearance may pass as many as 3,000,000 per day. The eggs then out hatch in the droppings on the veld, provided conditions of temperature and moisture are suitable. The warm wet weather of summer is most favourable, and hence spread of wire-worm infection is worst at this season. Hatching is very rapid, and may begin at once, since development of the eggs occurs even in passing through the intestines. Under favourable conditions eggs may hatch nineteen hours after being laid.

First Larval Stage.

When hatching occurs a small thread-like "larva" (immature development stage), about one-eightieth part of an inch in length, crawls out. This larva feeds on the manure in which it hatched, grows a little, forms a new skin, then moults or casts the old skin, and emerges as the second larval stage. The first larval stage is passed through in about one day.

Second Larval Stage.

At this stage the worm is about one-fiftieth of an inch in length, is very lively, and continues to feed on the droppings of the sheep. It then grows another skin, partially detaches the old skin while developing towards the third larval stage, and in this "ensheathed form" is called the "mature larva." The whole process takes less than two days, and the mature larval stage may therefore be reached about three days after hatching, provided conditions of warmth and moisture are favourable. It is in this stage that the worm is infective. Neither the egg nor the first larva can infect the animal, but at the mature larval stage the tiny worm proceeds to find a "host," *i.e.*, a sheep or other ruminant, in which to complete its development. At this stage it is about one-thirtieth of an inch in length, can live for a long time, and is migratory in habit. It leaves the medium (dung of the sheep) in which it developed, and travels up the damp blades of grass. In eating the grass the sheep takes the matured larvæ into the stomach, and in this way becomes infected.

Third Larval Stage.

The worm now commences the parasitic part of its life (first parasitic stage), casts its detached skin (remaining from the second stage), continues its evolution, forms a third skin, moults again, and emerges as the fourth larval stage.

Fourth Larval Stage.

At this "fourth larval" or "second parastic" stage, the worm commences to bore into the surface of the stomach, causing a slight effusion of blood. Within the blood clot so formed the larval worm is found. Growth continues, and a length of about one-fifth of an inch is reached in rather over a week, while at the same time differentiation of the sexes occurs. Male and female worms can then be distinguished. A fourth skin forms, is duly cast, and the young adult worm appears, the whole process being completed in about a fortnight from the time the mature infected larvæ entered the stomach.

Adult Stage.

This third parasitic or last stage of growth is completed in about another fortnight, during which time the worms grow from about a quarter of an inch in length to full size of one inch, and become sexually mature. Fertilisation then takes place, and the female begins to lay eggs, so completing the life-cycle of the worm.

Summary.

There are thus three non-parasitic stages—*i.e.*, the egg, the first larva, and the second larva—passed outside on the veld; and three parasitic stages—*i.e.*, the third larva, the fourth larva, and the adult stage (male and female)—passed in the stomach of the sheep. The time from entrance of the mature larva into the stomach until the first laying of eggs is about one month, and consideration of this period is, therefore, of the utmost importance in any system of dosing. If wire-worm is to be eradicated with certainty, dosing must be repeated at least once a month in order to prevent females from developing to the stage at which they can lay eggs and so perpetuate the infection. If they do manage to lay eggs these hatch out on the veld, develop, promptly reinfect the sheep, and restore the vicious cycle.

Influence of Season.

Since moisture and warmth are necessary for development of the eggs and early larval stages, veld infection is greatest during the warm, wet periods of the year. The infected larval stage may be reached in three days in warm weather, but only in three weeks in cold weather, and not be reached in frosty weather at all. A reduced infection of the veld may, however, prevail all the year round, especially in vleis, since the mature larva in its "sheathed from," and with its capacity for "migrating" or wandering along moist surfaces will live for a long time. Exposure to direct sunlight or drought will kill it, but under such adverse conditions it returns to the soil to hide, only coming out again to crawl up the grass in dull, damp weather. If, of course, the worms never find a "host"—*i.e.*, sheep or other ruminant—they finally die a natural death. The two practical points to remember are—

(1) That an infected pasture may remain infected for at least a year, and that all sheep grazing on it during this time are liable to become infected.

(2) That a living sheep spreads the infection so long as adult wire-worms are present in the stomach.

Eradication of Worms.

In order to suppress the wire-worm plague, it is therefore necessary to kill the wire-worms in the stomach of the sheep and to clear the farm of mature larvæ. The first task can be accomplished by using the Wire-worm Remedy supplied by the Division of Veterinary Education and Research (this remedy consists of a combination of arsenic and desiccated copper sulphate). The second is more difficult, and takes longer to accomplish. One method would be, of course, to keep away all animals which act as hosts (sheep, cattle, goats, buck) for at least a year, and so leave the larvæ to die a natural death, but this method is not feasible in ordinary farming. The other method is to allow the sheep to pick up the larvæ in grazing, but to kill them off in the stomach before they reach the egg-laying stage. Since the parasitic worm takes from three weeks to a month to reach sexual maturity, the treatment involves regular dosing at least once a month, especially during the rainy season. If this is done, no eggs are laid, no fresh infection on the veld occurs, and the larvæ which are not picked up by the sheep die in time. The farm is then clean, and provided no further infection is brought in from other areas dosing is no longer necessary. Although the possibility exists that the infection may be kept alive by ruminants other than sheep (cattle, buck), experience has shown that these cattle are only rarely infected, and hence systematic dosing of sheep and goats is generally sufficient to eradicate the disease. In the rare cases in which infected buck, with which dosing is impossible, do keep the infection alive, periodic dosing of the sheep and goats may have to be continued indefinitely. It must be remembered that the Wire-worm Remedy is a cure and not a preventative. It kills the worms in the stomach, but, of course, passes out of the stomach with the food, and hence cannot prevent reinfection. There is, therefore, no practical way of preventing reproduction of the worms except by killing them off regularly once a month until the source of infection on the veld itself disappears.

It may be added that the directions for use of the Government Remedy are arranged to eradicate worms as completely and quickly as possible without danger of poisoning the sheep. They are, therefore, more drastic than most remedies on the market, especially in regard to preliminary starvation treatment. Even if used under the less drastic conditions advertised for other remedies, however, the Government Remedy is as effective as any of them.

Analogy with Tick Eradication.

The principle underlying these recommendations will perhaps be clearer if it is compared with the principle of eradication of ticks. Ticks cannot be prevented from attaching themselves to the stock, and cannot be killed out in the grass in any feasible method. The stock, therefore, collect the ticks, but if the stock are regularly dipped the collected ticks are either destroyed or do not lay fertile eggs, and hence do not perpetuate the infestation. The ticks which do not attach themselves to stock die a natural death in course of time, and hence after a year or two of regular dipping the farm becomes clean. In the same way the sheep collect the wire-worm larvæ, and the dosing destroys them. In the case of ticks, short intervals between dippings, three to fourteen days according to the kind of ticks, are necessary, because the ticks breed very quickly after attaching. In the case of wire worms an interval of three to four weeks between dosings is sufficient to prevent breeding. If the dosing is systematically carried out the wire worms will be rapidly reduced to neglible numbers, just as ticks are reduced by dipping.

Diagnosis by Means of Culture.

A practical and easy method of finding out to what extent sheep are infected with wire worms, even before they show the ill-effects of the infection, is to cultivate the eggs from the droppings and observe the migrating larvæ. Every farmer can do this for himself by collecting fresh moist droppings from the suspected sheep, placing them in a glass jam-jar, placing the jar in a comfortably warm cupboard, and watching events from day to day. Provided the droppings have been sufficiently moist, a fine dew deposits on the sides of the glass, and from the fourth day onwards the larvæ, which have developed from the eggs passed out by the sheep in the droppings, begin to migrate, and form slimy white tracks ramifying over the surface of the glass. If the glass is now exposed to strong light, the larvæ will be observed to return to the droppings, and enter them again, provided they are still sufficiently wet. It should be added that "sour fæces" are unsuitable for culture, but that in most cases the experiment is successful, instructive, and useful.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE, GATTON.

MILKING RETURNS FOR MARCH, 1923.

Name of Cow.	Breed.	Date of Calving.	Total Milk.	Test.	Commercial Butter.	Remarks.
			lb.	%	lb.	
Yarraview Village Belle	Guernsey ...	19 Feb., 1923	651	5·6	43·09	
Royal Mistress ...	Ayrshire ...	25 Nov., 1922	720	3·5	29·40	
Bellona	,, ...	30 Aug., ,,	570	4·5	29·40	
Pretty Maid of Harelmar	,, ...	11 Sept., ,,	600	4·1	28·80	
Lady Peggy ...	,, ...	18 Nov., ,,	720	3·4	28·50	
College La Cigale	Jersey ..	10 July, ,,	410	5·5	26·65	
College Meadow Sweet	Friesian ...	18 Sept., ,,	560	3·4	26·10	
Confidence... ...	Ayrshire ...	13 Aug., ,,	570	3·9	26·10	
Yarraview Snowdrop	Guernsey ...	1 Sept., ,,	420	5·0	24·60	
College Mignon ...	Jersey ...	20 Nov., ,,	450	4·6	24·30	
Fair Lassie ..	Ayrshire ...	1 Sept., ,,	480	4·3	24·0	
Thyra of Myrtleview	,, ...	22 Aug., ,,	510	3·9	21·90	
Nina	Shorthorn...	12 Jan., 1923	600	3·1	21·60	

PROPOSED EGG BOARD.

A notice has appeared in the "Government Gazette" of the intention to declare that eggs (exclusive of those used for breeding purposes) produced in all that portion of Queensland lying east of a straight line from Bundaberg to Goondiwindi, and which are produced by persons keeping 100 or more hens, turkeys, ducks, geese, or guinea-fowls (including the males), shall be for two years from the 1st June, 1923, a commodity under "*The Primary Products Pools Act of* 1922," and to constitute an Egg Pool for such eggs. The persons who shall be eligible to vote on any Referendum or Election in connection with the said Pool prior to the 1st July, 1923, shall be persons keeping on the 1st May, 1923, at least 100 fowls as described above. Persons eligible to vote on any future Referendum or Election in connection with the Pool shall be persons who at any time during the preceding six months prior to the date of such Referendum or Election kept 100 or more fowls as above.

A notice is also being issued calling for nominations for the proposed Egg Board. These nominations will be received by the Under Secretary, Department of Agriculture and Stock, Brisbane, up to the 14th May, 1923. The Board will consist of five members, and each of the following districts shall return one representative:—

No. 1 District.—The Petty Sessions Districts of Bundaberg, Gin Gin, Mount Perry, Eidsvold, Childers, Maryborough and Biggenden, Gayndah, Tinana, Gympie, Kilkivan, Wienholt, Nanango, Maroochy, Caboolture, Woodford, and Kilcoy.

No. 2 District.—The Petty Sessions District of Redcliffe, and that portion of Brisbane north of the Brisbane River.

No. 3 District.—The Petty Sessions Districts of Wynnum, Cleveland, and that portion of Brisbane south of the Brisbane River.

No. 4 District.—The Petty Sessions Districts of Logan, Southport, Nerang, Beaudesert, Goodna, Ipswich, Lowood, Esk, Marburg, Harrisville, Dugandan, Rosewood, Laidley, Gatton, and Helidon.

No. 5 District.—The Petty Sessions Districts of Toowoomba, Clifton, Pittsworth, Allora, Warwick, Killarney, Inglewood, Texas, Goondiwindi, Stanthorpe, Highfields, Crow's Nest, Oakey, Goombungee, Cooyar, Jondaryan, Cecil Plains, and Dalby.

Each nomination must be signed by at least ten producers of eggs as above.

A roll is being compiled of persons eligible to vote on any matter in connection with the proposed Egg Pool, but in order to insure their names being on such roll, keepers of 100 fowls or more as above are invited to send their names at once to the Department of Agriculture and Stock.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE AVERAGE RAINFALL FOR THE MONTH OF MARCH IN THE AGRICULTURAL DISTRICTS, TOGETHER WITH TOTAL RAINFALLS DURING MARCH, 1923 AND 1922 FOR COMPARISON.

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Mar.,	No. of Years' Records.	Mar., 1923.	Mar., 1922.
North Coast.	In.		In.	In.
Atherton	8·97	22	11 09	5 91
Cairns	18·01	41	21·03	11·24
Cardwell	16·27	51	7·27	9·06
Cooktown	15·09	47	29·91	19·55
Herberton ...	8·34	36	5·98	5·91
Ingham	16·08	31	5·79	11·14
Innisfail	25.86	42	22·51	15·74
Mossman	18·86	15	18·14	23 08
Townsville	7·76	52	0·38	1·34
Central Coast.				
Ayr	7·20	36	0·63	1·01
Bowen	5 92	52	1·11	2·11
Charters Towers ...	3·77	41	0·50	8·12
Mackay	12·42	52	4·73	2·15
Proserpine	12·31	20	4·75	4·33
St. Lawrence ...	5 97	52	0·17	0·15
South Coast.				
Biggenden	4·17	24	2·87	0·65
Bundaberg	5·44	40	0·48	1·07
Brisbane	5·79	72	2·34	2·01
Childers	5.02	28	0·68	0·54
Crohamhurst ...	11·69	30	6·18	2·17
Esk	4·83	36	5·85	0 98
Gayndah	3 27	52	1·88	1·53
Gympie	6·26	53	2·50	2·01
Glasshouse Mts. ...	9·25	15	5·19	1·54
Kilkivan	4·03	44	1·79	1·87
Maryborough ...	6·30	52	2·41	0·80

Divisions and Stations.	Average Rainfall.		Total Rainfall.	
	Mar.,	No. of Years' Records.	Mar., 1923.	Mar., 1922.
South Coast—continued:	In.		In.	In.
Nambour	9·52	27	3·71	0·92
Nanango	3·37	41	4·65	0·60
Rockhampton ...	4·87	52	0·55	1·59
Woodford	8·13	36	4·64	1·39
Darling Downs.				
Dalby	2·72	53	1·53	0·48
Emu Vale	2 62	27	0·61	1·10
Jimbour	2·63	35	2·70	1·57
Miles	2·73	38	0·35	0·85
Stanthorpe ...	2·76	50	2·13	1·20
Toowoomba ...	3·89	51	1·33	0·94
Warwick	2 66	58	1·70	0·22
Maranoa.				
Roma	2·81	49	1·76	0·55
State Farms, &c.				
Bungeworgorai ...	1·64	9	0·56	0·26
Gatton College ...	3·41	24	2·19	0 03
Gindie	2·81	24	2·62	0·80
Hermitage ...	2·51	17	0·52	0·36
Kairi	7·90	9	...	7·15
Sugar Experiment Station, Mackay	11·53	26	2·82	1·59
Warren	2·74	9	...	1·01

NOTE.—The averages have been compiled from official data during the periods indicated; but the totals for March, 1923, and for the same period of 1922, having been compiled from telegraphic reports, are subject to revision.

J. H. HARTSHORN,
Acting State Meterologist.

DEPARTMENTAL APPOINTMENT.

J. P. Donlevy, of Cairns, has been appointed Government representative on the Cook Dingo Board during the absence of the Government representative, Mr. A. H. Scott.

The resignation of R. M. Troy, as millowners' representative on the Gin Gin Local Sugar Cane Prices Board, has been accepted, and Mr. N. E. Annand has been appointed in his stead.

Police Constable J. Topp, of Wyandra, has been appointed an inspector under "*The Slaughtering Act of* 1898."

THE COMMERCIAL PICKING, GRADING, AND PACKING OF APPLES, PEARS, PEACHES, TOMATOES, AND PLUMS.

By WM. ROWLANDS, Packing and Grading Instructor, Queensland.

The above-mentioned fruits are grown in such large commercial quantities in so many States that it is not profitable to produce or send to market any fruits unless they are of good shipping quality. A few purchases of the fruits mentioned that are immature or otherwise unsatisfactory will turn the consumer to other fruits. Therefore growers should use every endeavour to keep the markets free of fruits of undesirable

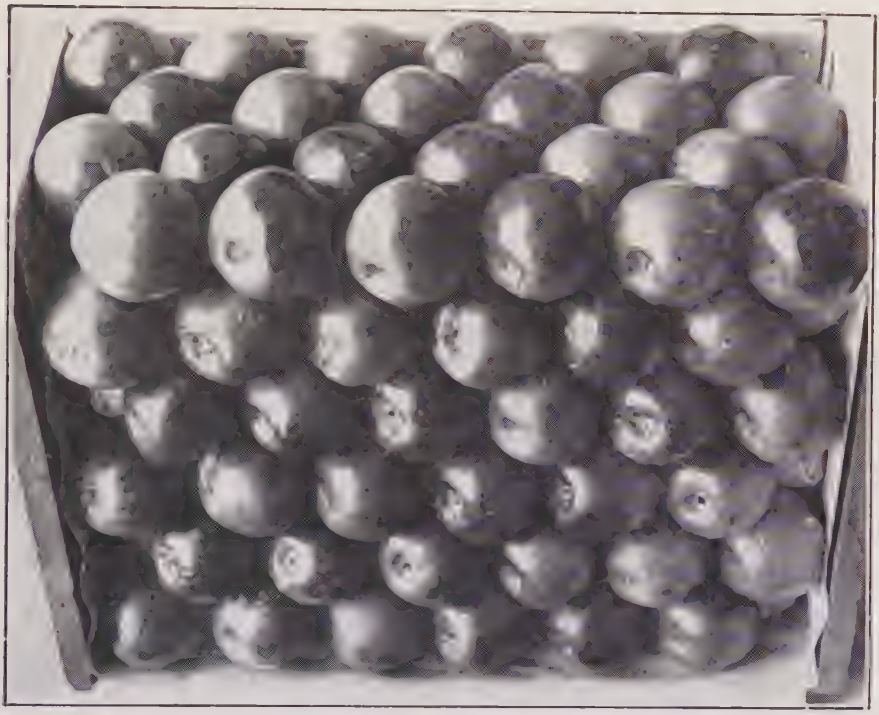

Fig. 1.—Well-packed Case of 2¾-inch Apples, Showing Top and Side View. Note Part of Apple Showing at Side.

variety and quality. This bulletin is designed to aid growers and shippers in preparing their fruits for markets in such a way that they may realise higher average returns with fewer losses. Growers must bear in mind from the start that it is absolutely necessary to grow and produce fruits of good quality to compete against other States. Readers should study the illustrations thoroughly.

DEMAND FOR WELL GRADED AND WELL PACKED FRUIT.

Experienced produce merchants will agree with the statement that any fruit or vegetable of desirable variety, well grown, carefully harvested, properly graded and sized, is more than half sold. On the contrary, fruits poorly grown or carelessly prepared for market are always disposed of under a decided handicap. The appearance of an article of fruit is the first point noticed by the consumer, the retailer, and the wholesaler. If the product is exhibited in dirty or damaged cases, if it is slack-packed, decayed, or not sized or graded for quality, the best "trade" will pass it by for other shipments of better quality and appearance. Years of observation on the part of those closely connected with the fruit business warrant the statement that markets are rarely glutted with fruits of first-class grade, size, and appearance. High-grade products will sell, and usually at a profit to the grower, even when ordinary or poor grades are going to waste. This situation is to be expected, since it is natural for both dealers and consumers to want the best. On a normal market the higher grades may be out of reach of many on account of the price, but when a market is glutted and the quotations drop, the "trade" will become more and more discriminating, the well-graded and well-packed will be taken and the inferior stock left or sold at a sacrifice. Wholesalers and retailers know that the higher the quality of their goods the less the chance of loss in deterioration, time, and customers. Every grower and shipper of fruits should realise that when profits accrue from their business, they generally are due to the marketing of produce of good quality and appearance. In certain years of scarcity poor fruits may be disposed of at a profit, but in the great majority of cases they are a source of loss to all persons engaged in handling them.

CARE IN HANDLING.

Many growers realise that care in handling during picking, grading, packing, and carting is necessary if they are to obtain profitable results, while others, either through ignorance or because of carelessness or indifference, subject their fruit to early decay and spoilage through needless rough handling during these operations. A great deal of rough handling is due to lack of knowledge of what constitutes careful handling. It is not generally realised that it is necessary to preserve the skin of any fruits in a sound, unbroken condition, "especially when fruit is intended for cool storage." Growers must awaken to the fact that it is their business to see that their pickers, packers, graders, and carters each do their share to eliminate rough handling. The writer has noticed that growers and others when carting use a full case of packed fruit for a seat. This is a bad practice and should be avoided. The case so used may be opened by the agent to sell the whole of that particular consignment. In Launceston recently a case was opened to show a grower the result of such treatment, and it was found that 90 per cent. of the fruit therein was badly bruised, while the remainder of the load was perfectly sound.

ORCHARD BOXES.

The use of orchard boxes cannot be too strongly insisted upon in harvesting fruits of any kind. Shipping cases, when used for handling fruit in the orchard, almost necessarily become soiled and warped, and a soiled case is a cheap case, notwithstanding the grade of fruit that may be in it. The writer suggests the use of second-hand benzine and petrol cases for this purpose. These cases, if banded with hayband wire, will last for several years; they are much lighter and also much cheaper to the grower (wiring benzine cases being good employment for pickers on wet days). One Tasmanian orchardist during the 1918 season made 500 cases as suggested, and after four seasons' picking still has the original 500, not one being broken. (See Fig. 2.)

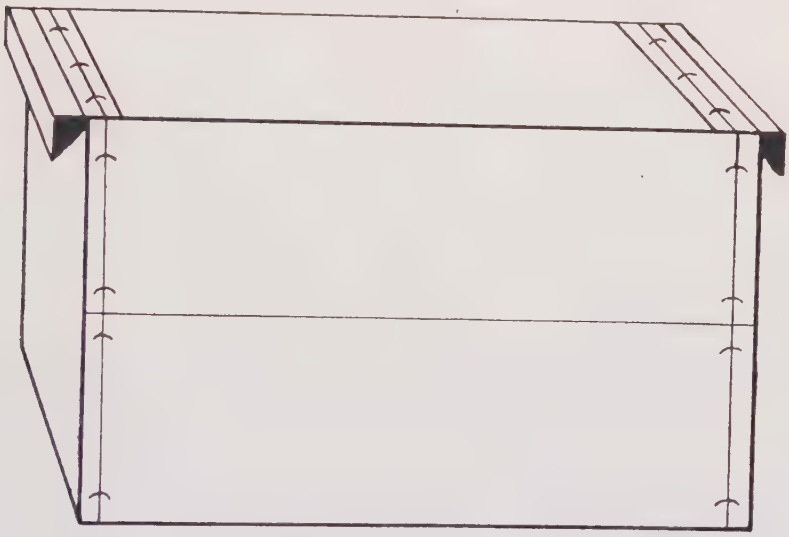

Fig. 2.—Orchard Box.

APPLES.

Picking.

An all-important matter to be first considered is the correct time for harvesting. The proper picking of apples is a most important operation in preparing this fruit for market. The best judgment must be exercised in selecting apples in the right stage of maturity to carry properly. Experience on the part of the growers and pickers is necessary if good results are to be obtained. As a matter of fact, it is difficult to make a rule that will state just when any particular kind should be picked, for so much depends on such things as variety and district and seasonal conditions; and directions that may apply in one district will not necessarily hold good in another. Colour of the fruit is taken by some growers as a deciding factor in determining when to pick, while others rely on the falling of the fruit from the trees. In order to pick apples at the

proper stage of maturity, orchardists must learn the traits and characteristics of each variety in his own particular district. For example—the Gravenstein has a tendency to fall before ripening; on the other hand, if left on the trees too long it may develop core-rot. Jonathans fall at the time of ripening, while Sturmers, Croftons, and Tasmas may be left on the trees several weeks after most other varieties have been picked.

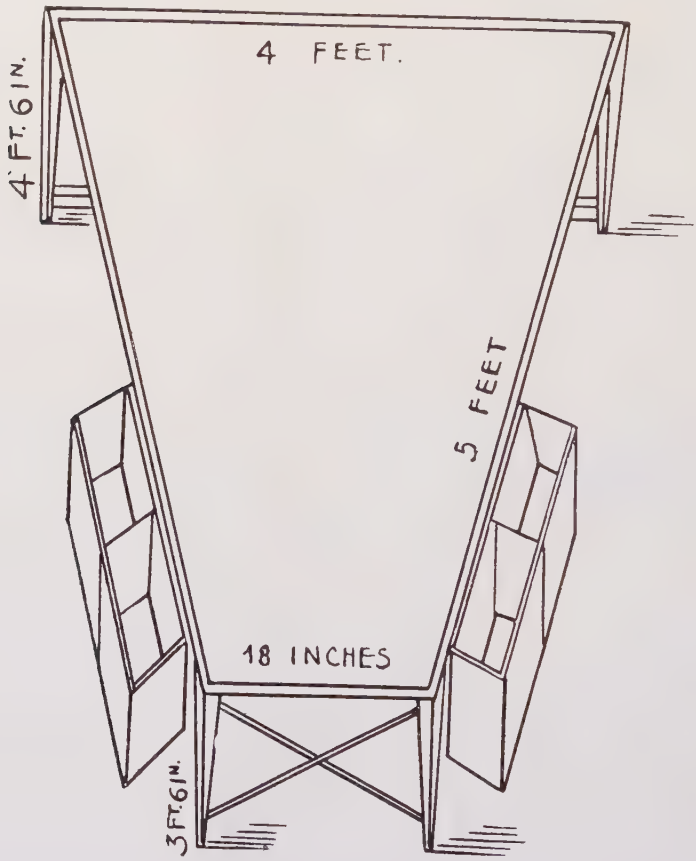

FIG. 3.—ORCHARD BIN.

Number of Pickings.

Many growers strip their trees when picking (that is, pick all the fruit, large or small, mature or immature). Growers should realise that a crop of fruit is not to be treated like a wheat or hay crop by making a clean sweep at picking time; instead, they should take the fruit as it matures, thereby getting a 10 to 20 per cent. better average and simplifying grading and sizing. The more prosperous and experienced orchardists make three to four pickings of apples.

Damage During Picking.

The writer is of the opinion that 50 per cent. of damage to fruit occurs during picking, and suggests to growers who employ pickers to demonstrate to them how to pick at the beginning of each season, and to impress on them the necessity for careful handling.

Hints to Pickers.

Do not squeeze fruit when picking.

Do not drop fruit into picking bags or buckets.

Do not empty fruit from your bags or buckets into cases roughly.

Do not pick up windfalls and mix with freshly-picked fruit.

The picking up of windfalls should be a separate operation.

Always place the orchard boxes on the shaded side of the tree when full. A few hours in the sun after picking is not good, especially when fruit is intended for cool storage. This is very important.

Sizing and Sorting.

Perfect sizing is essential if perfect packing is to be done.

There are several methods of sizing, by machine and by hand.

Of recent years great improvements have been made in the mechanical sizers. There are several makes of these machines in use in Australia, including the Ideal, Lomas, and the Nelson. It is not our purpose to recommend any particular one. The great essential, however, is to size properly, whether by hand or machine. If apples are sized into four dimensions—namely, $2\frac{1}{4}$ inch, $2\frac{1}{2}$ inch, $2\frac{3}{4}$ inch, and 3 inch—they will meet all requirements for the export trade. Larger or smaller should not be sent to distant markets. In determining the size of apples, they are measured from cheek to cheek, not from calyx to stem. When sizing is done by hand, rings or wooden gauges cut to the required sizes may be employed, not necessarily for every apple, but when the person sizing is in doubt. Apples that drop through the $2\frac{1}{2}$-inch ring and remain on the $2\frac{1}{4}$-inch ring are $2\frac{1}{4}$; those remaining on the $2\frac{1}{2}$-inch ring after passing through the $2\frac{3}{4}$-inch ring are $2\frac{1}{2}$-inch apples; and those passing through the 3-inch ring and remaining on the $2\frac{3}{4}$ inch are $2\frac{3}{4}$-inch apples. Thus it will be seen that nearly a quarter of an inch variation is allowed. If one-size apples are $\frac{1}{8}$ of an inch under or over the dimensions above, it will, of course, make much difference in packing. When possible, sizing and packing should be treated as two distinct operations, and performed by different and specially trained workers. The persons sizing should not only size, but throw out all undesirable specimens. The packers should be free to give attention to securing a pack of standard quality which is both firm and attractive. Sizing operations would be simple if growers made several pickings from each tree as suggested on page 390, under the heading of "Number of Pickings."

Packing.

We can look back over past years and note the evolution of packing, from the old "rough" pack to the "square" pack, and lastly to the "diagonal" pack, which is recognised as the standard throughout prosperous fruitgrowing centres. It has been the object in other States to simplify the method of packing and lessen the variation of packs. At the present time standard "diagonal" packs are exclusively used throughout New Zealand and America. Growers and packers must, therefore, bear in mind that badly-packed apples placed upon the larger markets will come into direct competition with those from other States and New Zealand, where packing has attained a degree of efficiency and excellency difficult to surpass.

In Tasmania there are two packs, known as the "square" pack and the "diagonal" pack. The diagonal is the pack recommended as the only pack to suit our dump case. The name "diagonal" is derived from the fact that the rows of apples resting cheek to cheek always produce diagonal lines across the layers to which they belong, and when the case is opened—whether at top, side, or bottom—the same effect is produced. To pack all commercial apples only three distinct packs are necessary, embracing six different sizes (that is, if sized to the $\frac{1}{4}$-inch); thus it will be seen that any deviation from the three packs mentioned is unnecessary. These three packs are known as the 3—2, 2—2, and 2—1. The 3—2 pack is for medium or small apples, and the 2—2 is for $2\frac{1}{2}$-inch apples up to and inclusive of $2\frac{7}{8}$ inch. The 2—1 pack comprises 3-inch, $3\frac{1}{4}$-inch, and $3\frac{1}{2}$-inch. It may be mentioned, however, that sometimes, owing to the ends of the case not having shrunk to the required size—viz., $8\frac{2}{3}$ inch —$2\frac{1}{2}$-inch apples may pack 3—2, but this is not often the case. However, with a little commonsense on the part of the packer, he will soon discover if 3—2 or 2—2 is needed. Figs. 9 10, and 11 illustrate the method of determining the different packs. It cannot be too strongly emphasised that no benefit is gained and only confusion caused by attempting any other packs than the three mentioned above. All these are diagonal packs. By this is meant that the apples are arranged in rows, with each apple touching the one next to it. Another distinction between the diagonal and square packs is that in the diagonal the apples are placed over the spaces between the specimens below, and not directly on top of them, as in the square packs. In order to be a successful packer, it is necessary for the beginner to follow closely the instructions here. Any deviations are unnecessary, and will lead to disappointment and confusion. The same will apply to those who have endeavoured to master the art either without proper tuition or along less up-to-date lines. Experience has proved that the diagonal pack makes it possible to pack firmly practically any sized apples, resulting in a better commercial pack from all viewpoints. Bruises are reduced to a minimum, the pack is firm and elastic and will not shift, and a more attractive article is placed on the market, commanding a more ready sale. It is not recommended to bulge-pack the dump case.

fruit has reached the markets. It is now generally required that fruit must be sized before going to the packers.

Methods by which Packer will Determine Packs to be Used.

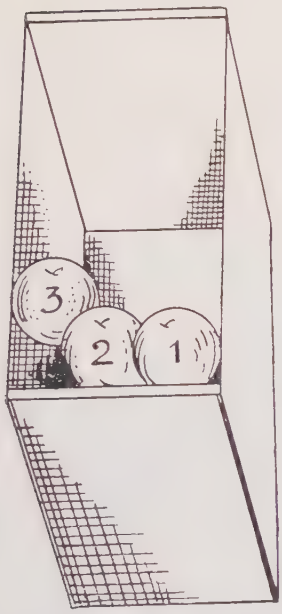

Fig. 9.

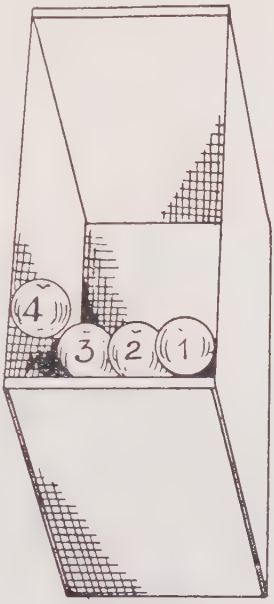

Fig. 10.

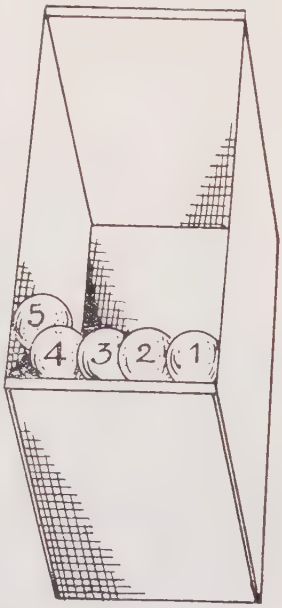

Fig. 11.

Fig. 9.—If Two Apples of the Same Size Fit Loosely Across the Case Side by Side, and the Third will not go in, the Pack is 2—1; Five Layers to a Case.

Fig. 10.—If Three Apples of the Same Size Fit Loosely Across the Case Side by Side, and the Fourth will not go in, the Pack is 2—2; Six Layers to a Case.

Fig. 11.—If Four Apples of the Same Size Fit Loosely Across the Case Side by Side, and the Fifth will not go in, the Pack is 3—2; Seven Layers to a Case.

Very Fast Packing.

In the past packers have been usually paid by the case for their work; hence it is obvious they wish to pack the greatest number of cases possible each day. Therefore, results are not likely to be satisfactory. Very fast packing is not recommended, for the following reasons:—

(1) Fast packing tends to slum, and wrapping-paper is not placed round the apples properly; therefore its value is much lessened.

(2) In putting the first apples in each layer against the end quickly they bruise. It has been noticed repeatedly during inspection that the apples in the end of the case where the pack starts are bruised, and apples in the other end are quite sound.

Some packers in Tasmania pack between 100 and 150 cases in eight hours, but the writer, after packing in different parts of Australia and New Zealand, has noticed that the best results have been obtained from packers whose capacity is between 50 and 80 cases. The packer who packs 50 to 80 cases in eight hours, and packs them well, is worth more to his or her employer than the packer who packs over the 100 and slums them. Every packer should make a habit of packing each case firmly, but under no circumstances should apples be forced into position. It has been noticed in some sheds that packers, after packing the best part of the case, will spoil the whole case by pressing the last apple into position, often cutting or bruising same on top end of the case, with the result that decay sets in.

PEARS.

Urgent Need for Better Grading and Packing.

In all districts and on every crop about half of the marketing troubles appear to be concerned with the problem of securing a steady and properly prepared output of uniform grade, quality, and appearance. It would not be difficult to obtain such results if all the individual growers in the community produced crops of the same quality and variety, handled them in the same way, and were both competent and willing to grade and pack them correctly. However, such conditions are rarely found. Too often growers ship pears which they acknowledge are not of desirable quality—fruit which they themselves would not eat. If growers of this type can get their poor fruit past the inspector, or conceal it in their carts under fruit of better appearance, they feel they have profited. Unfortunately, this does not end the matter. The wholesaler will have difficulty in disposing of the poor fruit, while the retailer, in turn, probably will lose on it. If it reaches the housewife she will throw it away, and turn to other fruits of better quality, thus decreasing the sale of further consignments. In all these cases the grower eventually loses, directly or indirectly. If the actual loss in money is not deducted from his net returns, he suffers from the injury done his reputation and that of the industry generally. At first thought it would seem reasonable to expect the agents, shippers, or distributors to eliminate such practices, but there is as a rule so much competition among them that they do not accomplish the reforms which individually they know to be desirable. These various weaknesses in the methods now in general use, which are preventing a much-needed improvement in marketing apples and pears, argue for a more efficient system of grading, packing, and inspection of this product.

Picking.

With the pear the proper time for picking may be told best by taking the fruit in the full of the hand and giving it a lateral twist, with the stem taking leverage over the index finger. If fit for picking, the stem will let loose from the fruit spur without breaking. The pear must be picked before ripening, in order to get best quality in flavour and lusciousness. To exactly determine when a variety of pears is ready for harvesting, the grower must judge by the size the fruit has attained and by the ripening of a few premature ones that are always present in a tree. The seed may also be turning at the time. It is recommended to make several pickings, thereby getting a more even size of fruit, resulting in a better average from the orchard. The same careful handling applies to pears as to apples.

Sizing.

Commercially, pears are sized in four different sizes viz., 2¾-inch, 2½-inch, 2¼-inch, and 2-inch. In determining the sizes of this fruit it is measured from cheek to cheek, and not from stem to calix. Persons sizing should use rings or wooden gauges cut to the above sizes, remembering that pears going through the 3-inch ring and remaining on the 2¾-inch ring are considered to be 2¾-inch pears. Pears passing through the 2¾-inch ring and remaining on the 2½-inch ring are included with the 2½ size, and those dropping through 2½-inch rings and remaining on the 2¼-inch ring are considered as 2¼-inch, allowing a quarter of an inch variation, which will meet all requirements.

Packing 2—1 Pack.

Half-cases.—The writer does not recommend the packing of pears in bushel cases, because experience has proved that for shipping and cool storage purposes half-cases and trays have given best results. To pack half-cases it is recommended that the lid part of the case be at the 7½-inch board as shown in Fig. 13.

Fig. 12.

Fig. 13.

Fig. 12.—Top View of 2¾-inch Pears.
Fig. 13.—Side View of 2¾-inch Pears.

Illustration 12 shows the first layer of $2\frac{3}{4}$-inch pears packed in half-cases; illustration 13 shows the side view of the same size. It will be seen that $2\frac{3}{4}$-inch pears pack 2—1 four layers to the half-case. Note that each successive layer is placed immediately in the spaces made by the layer below, and the pears finishing the layers are reversed. Illustration 14 shows first layer of $2\frac{1}{2}$-inch pears. Illustration 15 shows side view of the same size. It will be noted that $2\frac{1}{2}$-inch pears also pack 2—1, four layers to the half-case. The reason of this is, being $2\frac{1}{2}$-inch, the pears pack closer together, decreasing the space between each specimen.

FIG. 14.

FIG. 15.

FIG. 14.—TOP VIEW OF $2\frac{1}{2}$-INCH PEARS.

FIG. 15.—SIDE VIEW OF $2\frac{1}{2}$-INCH PEARS.

2—2 Pack. Half-case Packing.

Half-cases.—The 2—2 pack is used for 2¼-inch and 2-inch pears. Illustrations 16 and 17 show the first layer and side view, respectively. It will be noted that five layers fill the half-case; always remembering to reverse the last two pears in each layer. The reversing is essential to produce a firm pack.

Fig. 16.

Fig. 17.

Fig. 16.—Top View of 2¼-inch Pears.
Fig. 17.—Side View of 2¼-inch Pears.

Packers will have considerable difficulty in packing 2¼-inch pears if the opening of the half-case is the same as the bushel. But make your half-cases as shown in Fig. 16, follow the instructions, and little difficulty will be experienced. Again reverse the last two pears in each layer. Take care not to break the stem end, and eliminate stemless specimens, especially for cool storage and distant markets. Size pears before commencing to pack, and do not roll the fruit about on the packing table, but pack from case to case.

Trays.

It has been found that for export to overseas markets the tray is preferable as a package for pears. There are several reasons for this—(1) The fruit carries better, (2) it facilitates packing, (3) shows fruit to better advantage, (4) eliminates much bruising at the stem end. This part of the pear ripens first and requires very careful handling.

FIG. 18.—SHOWING 2¾-INCH, 2½-INCH, 2¼-INCH PEARS PACKED IN TRAYS. AS THERE IS ONLY ONE LAYER, THE ILLUSTRATION IS SELF-EXPLANATORY.

PEACHES.

The greatly increased production of peaches, with the resulting keener competition on the markets, makes it more necessary than ever that every commercial grower of this product should produce fruit of fine quality, eliminate undesirable varieties, pick carefully, size and pack correctly, to enable the fruit to carry to the markets in the best possible condition. As in the case of all soft fruits, peaches must be handled rapidly and very carefully throughout harvesting, sizing, and packing operations.

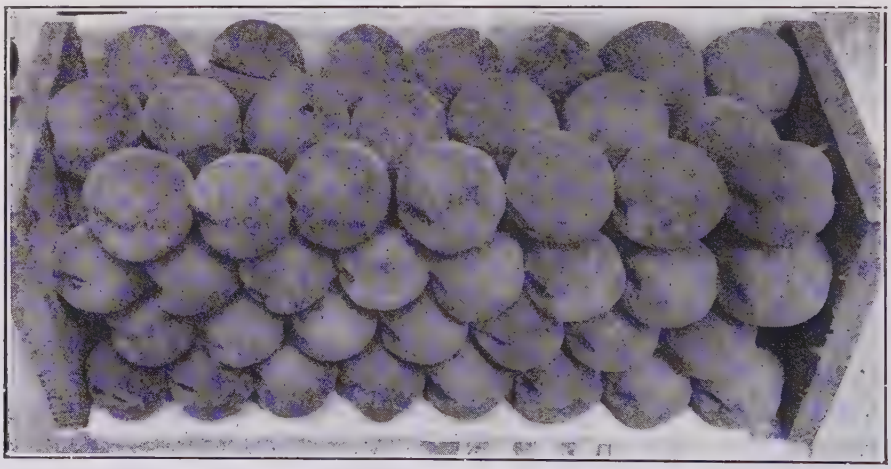

FIG 19.—SIDE AND TOP VIEW OF WELL-PACKED CASE OF 2¾-INCH PEACHES.

Picking.

The time for picking the peach depends largely upon the distance of the markets. Local markets will allow the peach to ripen further than when it is intended to be shipped in closed vans and in transit a number of days. Peaches are often allowed to ripen and colour too much before being picked, resulting in early decay and excessive over-ripeness. However, the peach should have attained full size and started slightly to colour at the time of picking. When picking peaches extreme care should be taken to handle the fruits without squeezing or unnecessary pressure. With a side twist of the hand remove the peaches from the branches without injuring the flesh. The fruit should not be dropped into picking baskets, but each specimen should be laid gently and quickly in the bag or basket, great care being taken when emptying the contents of bag or basket into the orchard box.

Sizing.

When sizing peaches do not empty the fruit on to a packing table or bench, but instead size direct from the orchard box into shipping cases. The packer can then pack direct from case to case, eliminating rolling

Fig. 20.

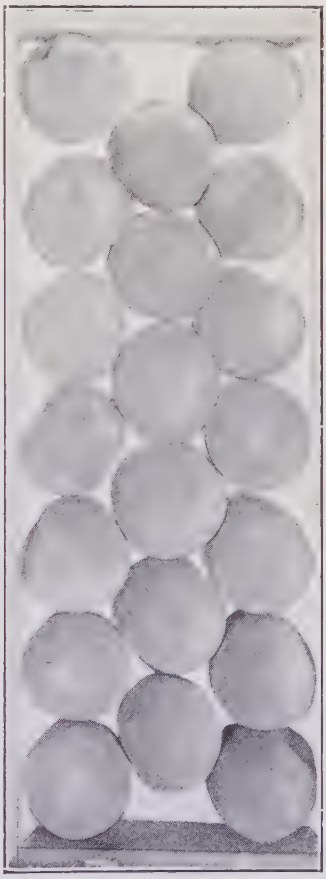

Fig. 21.

Fig. 20.—Side View of 2¾-inch Peaches.
Fig. 21.—Top View of 2¾-inch Peaches.

of the fruit about on the benches and searching for the various sizes. If the peach is sized into $2\frac{3}{4}$-inch, $2\frac{1}{2}$-inch, $2\frac{1}{4}$-inch, and 2-inch sizes they will meet all requirements.

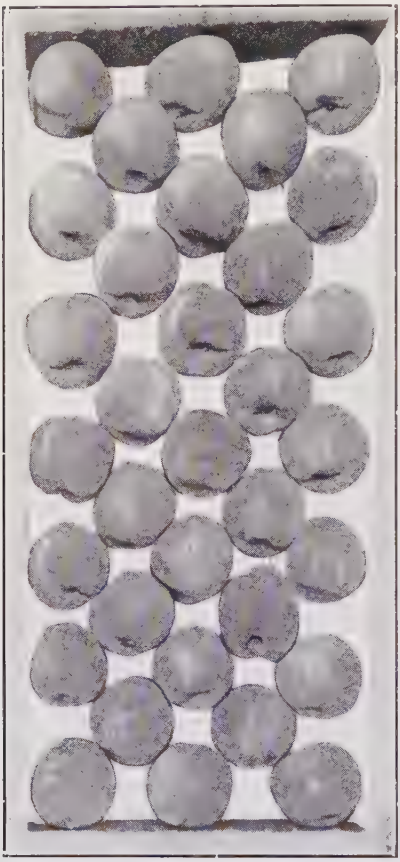

FIG. 22.

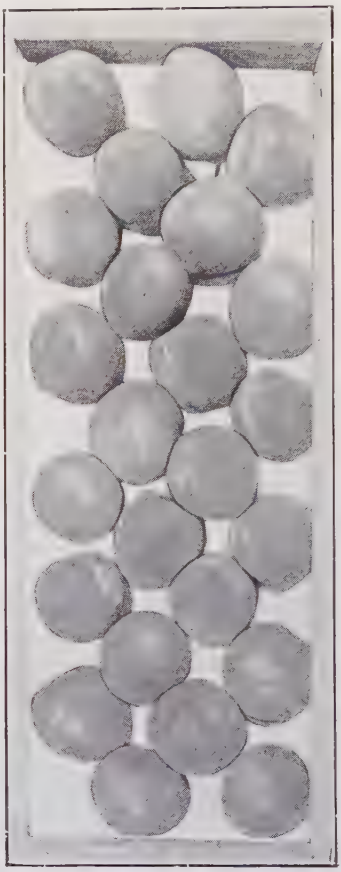

FIG. 23.

FIG. 22.—SIDE VIEW OF $2\frac{1}{2}$-INCH PEACHES.
FIG. 23.—TOP VIEW OF $2\frac{1}{2}$-INCH PEACHES.

Packing.

Retailers and shopkeepers desire that the projecting portion of the peach—that is, the part which ripens and colours first, should not be bruised. If peaches are displayed in shop windows with this part disfigured they look unsightly and decay early and are a loss to the retailer, which is indirectly a loss to the grower. Therefore, it is necessary to preserve this part of the peach by packing in such a way that it does not come in contact with the sides of the case. Illustration 19 shows part of peach touching the side of the case. The stem end is considered

to be the hardest part of the peach, and illustration Fig. 19 shows this part of the fruit packed towards the side. The great essential, however, for successful packing is correct sizing.

Illustration 20 shows top view of $2\frac{3}{4}$-inch peaches.
Illustration 22 shows top view of $2\frac{1}{2}$-inch peaches.
Illustration 25 shows top view of $2\frac{1}{4}$-inch peaches.
Illustration 21 shows side view of $2\frac{3}{4}$-inch peaches.
Illustration 23 shows side view of $2\frac{1}{2}$-inch peaches.
Illustration 24 shows side view of $2\frac{1}{4}$-inch peaches.

Take particular care to pack each successive layer in the spaces of the former layer.

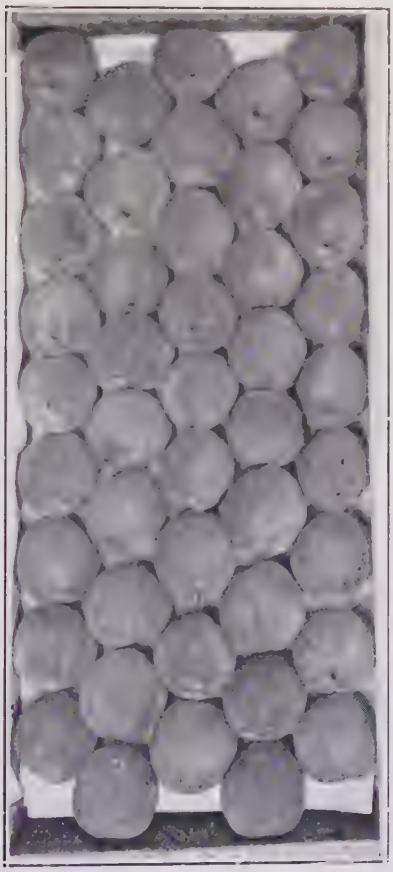

Fig. 24.

Fig. 25.

Fig. 24.—Side View of $2\frac{1}{4}$-inch Peaches
Fig. 25.—Top View of $2\frac{1}{4}$-inch Peaches.

TOMATOES.

Much can be said in favour of sizing and packing tomatoes, especially when they are required for shipping to local or distant markets. It is of great importance that the tomatoes in each case be of uniform size, for large and small tomatoes packed together constitute an undesirable package. It not only makes a very poor appearance on the markets, but is disliked by retail buyers because of the fact that the tomatoes contained therein cannot all be sold at the one price. Restaurants, hotels, railway dining-cars, and similar institutions require tomatoes of even size, as the *trade demands* make it desirable for them to serve every customer with equal portions. The tomato-grower who wishes to establish a reputation for himself should size and pack carefully.

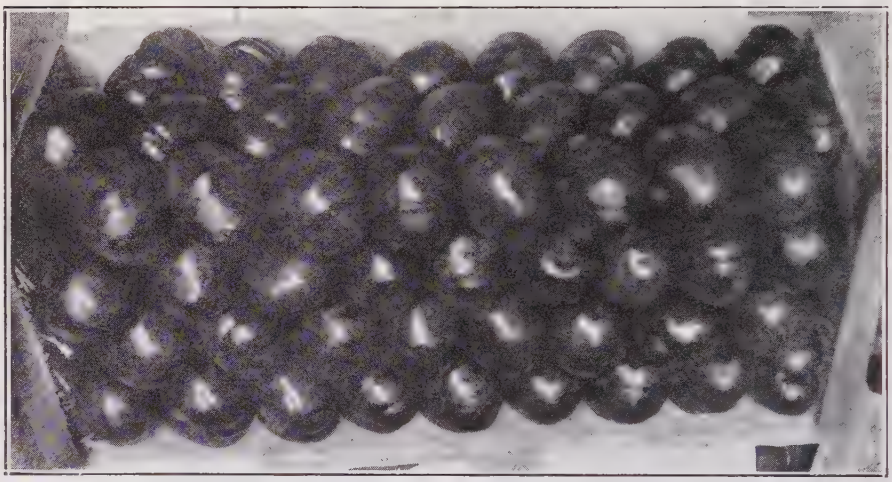

FIG. 26.—SHOWING SIDE AND TOP VIEW OF WELL-PACKED CASE OF $2\frac{3}{4}$-INCH TOMATOES.

Picking.

When tomatoes are to be forwarded to the markets by rail or steamer they should be picked when they show a yellowish colour; for immediate sale they should be fairly ripe. Careful handling of this product is essential. Each vine should receive equal attention in order to prevent some of the fruit becoming over-ripe. Tomatoes should be marketed as soon as possible after picking.

Sizing.

This operation is carried out on the same lines as for peaches and apples, with the same variation of a quarter of an inch. Tomatoes over the size of 2-inch diameter should be sent to the cannery or factory. Sized to $2\frac{3}{4}$-inch, $2\frac{1}{2}$-inch, and $2\frac{1}{4}$-inch, they will suit the trade admirably.

Do not empty or roll tomatoes about on the benches. It is much quicker and gentler to size direct from the orchard box or basket into the marketing cases.

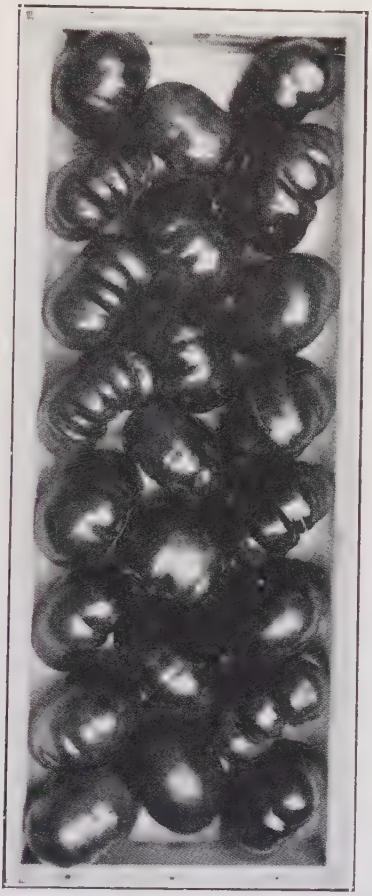

Fig. 27.

Fig. 28.

Fig. 27.—Side View of 2¾-inch Tomatoes.

Fig. 28.—Top View of 2¾-inch Tomatoes.

Packing.

Tomatoes are packed similarly to apples—that is, as far as the placing of the fruit is concerned. Fig. 27 shows first layer of 2¾-inch with tomatoes packed 2—1, four layers to the half-case. Fig. 28 shows 2½-inch tomatoes packed 2—2, four layers to the half-case; 2¼-inch tomatoes pack 2—2, five layers to the half-case; the placing of this size is more on the angle.

PLUMS.

The illustration Fig. 28 shows plums packed in trays and half-cases. The trays are found to be the most suitable for the carriage of this fruit, half-cases being too bulky. The inside measurements of the trays are 18 by $2\frac{7}{8}$ by $14\frac{1}{4}$. (This size tray is also used for pears.) Large plums, such as Grand Duke, Presidents, &c., packed on their ends make a fine display, one layer to each tray; while smaller plums (Greengages, &c.) pack two layers to the tray. The illustrations are self-explanatory. It is not recommended to wrap plums for nearby markets, but for cool store and distant markets we have found it advisable to wrap.

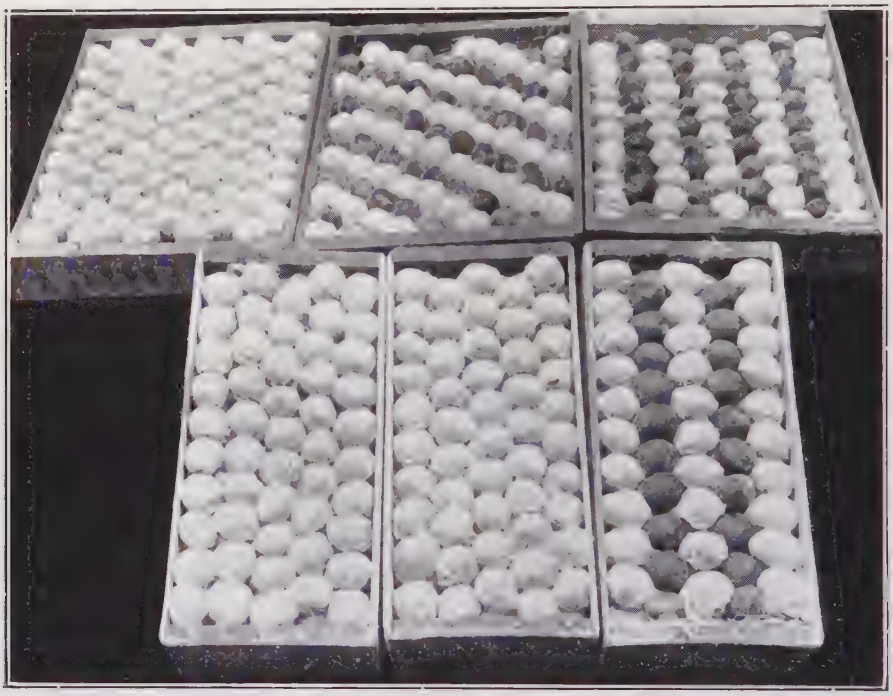

FIG. 29.—PLUMS PACKED IN SINGLE-LAYER TRAYS AND IN HALF-BUSHEL CASES—SOME WRAPPED, OTHERS UNWRAPPED—AS SHIPPED FROM TASMANIA TO ENGLAND, MARCH, 1922.

COTTON PESTS IN NORTH QUEENSLAND.

Mr. B. L. Jardine, Somerset Copra Plantation, North Queensland, writes:—In respect to the recent report made available by the Minister for Agriculture (Hon. W. N. Gillies) under the heading "Cotton Pests Occurring on the Darling Downs" ("Q.A.J.," December, 1922), I beg to report the following:—In this locality the same trouble was experienced a short while back, and for a time the position was very grave, as complete destruction of the crop was threatened. Immediate investigations, with the object of minimising further destruction, were made and, notwithstanding the early discovery and quick arrest of the trouble, considerable damage was done to the rest of the young plants, the nature of which resembled that described in the notes referred to.

Soon after the planting of the seed, between the third and fourth day, the first evidence of some nocturnal incursion was noted. At this period the young plants were commencing to show through the earth and many were found to have been severed below the bursting seed cells and leaves, with no further disfigurement to the dismembered parts. Day after day the trouble continued with increasing intensity until the surviving plants had attained the height of 5 or 6 in. Then the trouble vanished as abruptly as it came. The gaps in the rows were replanted, only to meet with a heavier percentage of loss. An examination made of the planted areas in the early hours of the morning revealed the cause of the destruction. A large reddish black ant $\frac{5}{8}$ in. long, armed with powerful saw-like mandibles, its forepart not unlike the stag beetle, was attacking both seeds and young shoots with great avidity. It was also noticed that rodents had developed a keen taste for the seed and proved a nuisance equally as great.

Habits.—The ant is nocturnal in habit and lives in sub-surface communities in cavities connected with the open by a passage or tunnel. By day its movements are sluggish and are confined to the vicinity of its colony; but at night it becomes very active, and, like most insects of its class, has no particular preference to any one fodder plant, and is therefore a ready victim to poison.

Remedies.—Soon after the land has been cultivated a search for their colonies should be made. These may be located easily by the newly powdered earth thrown up. (1) Insert caustic soda in tunnels, then add water; (2) poison-arsenic, soda, and syrup; (3) medicate seed before planting with ten drops of lysol or phenyle to pint of water; allow the seed to stand in the solution for an hour or so before planting. This will be found very effective. (4) No. 3 in addition to poisoning as an effective precaution against rats.

QUEENSLAND TREES.

By C. T. WHITE, F.L.S., Government Botanist, and W. D. FRANCIS, Assistant Botanist.

No 20.

The Rose-leaf or Pink Marara, *Ackama paniculata,* is a very common tree on Roberts's Plateau and on the Eungella Range, further north. Our pictures show typical specimens of the species. The barrel is very often flanged at the base. The bark is light or yellowish grey in colour and often wrinkled with warts disposed in rows or in the wrinkles; when cut it is pale brown or pinkish, becoming paler inwards. The surface of the sapwood is white when the bark is peeled off. The generic name Ackama originated from the Maori name "Makamaka" for a closely allied tree, *Ackama rosæfolia,* growing in the North Island of New Zealand. Our species is confined to Australia and is found in rain forests as far south as the Hawkesbury River in New South Wales (C. Moore), and as far north as the Eungella Range, westward of Mackay in Queensland. The Northern Rose-leaf Marara, *Ackama quadrivalvis,* which is found at Atherton and Rockingham Bay, resembles the southern species in many ways. Its chief difference is in the possession of 4 (rarely 3 or 5) cells in the capsules instead of the 2 cells of the more southern species.

Photo. by the Authors.

PLATE 93.—THE ROSE-LEAF MARARA (*Ackama paniculata*).
A tree on Roberts Plateau, National Park.

Photo : Dept. Agriculture and Stock.]

PLATE 94.—THE ROSE-LEAF MARARA.

A.—Flowering twig. B.—Twig bearing capsules.

THE WORLD'S PRODUCTION OF TEXTILE CROPS.

The International Institute of Agriculture at Rome has published an interesting report on the world production of textile crops in 1922, as compared with pre-war production. In summarising its findings, it places the aggregate cotton production of a group of countries responsible for about 85 per cent. of the world's total production at 73,000,000 centals, or a decrease for 1922 of approximately 16 per cent., as compared with the corresponding pre-war average of 87,000,000 centals, although showing an increase over the production of 1921-22, which was 59,000,000 centals. The production for 1921-22 was, however, exceptionally poor, due in a great part to the deficient yield of the United States, which was the lowest recorded for twenty-five years. The cultivated area under cotton in 1922-23 (56,000,000 acres) exceeded that cultivated the previous season by about 12 per cent., and was only 4 per cent. below the pre-war average cultivation. The yields per acre in 1922-23 even cannot be looked upon as favourable, a yield of only 1.3 centals per acre being obtained, as compared with an average of 1.5 centals for the five years' period, 1909 to 1913.

STUD STOCK STUDIES.

Best Breeds of Pigs for Queensland Conditions.*

Tamworths.

Authorities claim this breed is directly descended from the wild pigs of Europe, and that it has been domesticated in the Midland Counties of England for centuries, and the manner in which it gathered its food there, no doubt, has had a good deal to do with perpetuating the long, straight snout and razor-back appearance characteristic of the breed. Latterly, a limited improvement has been effected in the body conformation of the best specimens of Tamworths, but careful selection is necessary to maintain type.

The chief characteristics associated with the improved Tamworth are:—

A distinctive whole-red coating of hair; a long narrow head and straight snout; fine, rigid ears with a forward inclination; rather fine, lengthy neck; fine shoulders; long, narrow, slightly arched back, with strong loin; lengthy, meaty hindquarters which, with a well set-on tail, finishes off a body which must have good depth, and be supported by strong, straight, evenly placed long legs, with flat bone.

The Tamworth is recognised as a gross feeder; it possesses a good constitution, and is prolific, the sows being good mothers and free sucklers.

Farmers with an eye for the neat, symmetrical outline of the Berkshire and Mid. Yorkshire, are not attracted by the lengthy snout, narrow head and body, and the lean-looking appearance of the Tamworth. These characteristics will naturally keep the latter, as a distinctive breed, from gaining universal favour.

Poland-China.

This breed is a composite one, evolved in the hog-raising States of U.S.A. The chief characteristics of the breed are as follows:—

Colour, black, with white markings on face and legs; of medium size; short and compact; thickly fleshed; deep bodied, and set on short, evenly placed legs. The head is short and broad; short face with a distinct taper from eyes to point of nose; ears slightly drooping; full jowl; neck, full and short; shoulders, full and rounded on top; ribs, well sprung and deep; body, even and deep, with good underline, showing full, thick flanks; full, deep, fleshy hams.

Authorities agree as to the docility of this breed of pig and its ability to rapidly lay on a wealth of flesh and fat; the tendency, however, is for the animals to become too fat, which has earned for them the designation of "lard" hogs.

It is not considered that the Poland-China enjoys any advantages over the Berkshire for use in this State, but rather that it is inferior to the former in size, length of body, and prolificness.

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*From "Pig Raising in Queensland" (E. Graham and H. C. Quodling), Department of Agriculture and Stock, Queensland, October, 1922.

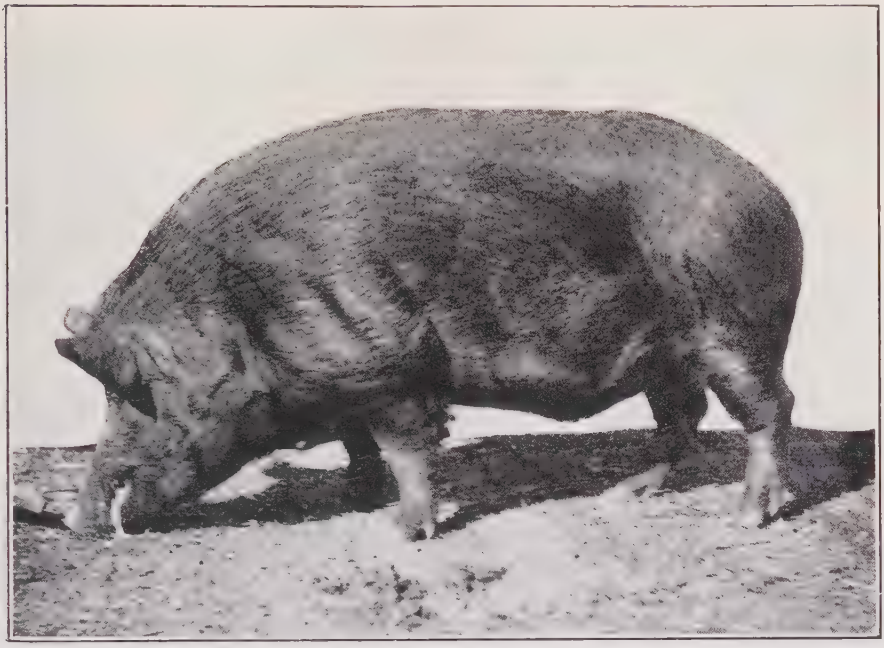

Plate 95.—Tamworth Boar.

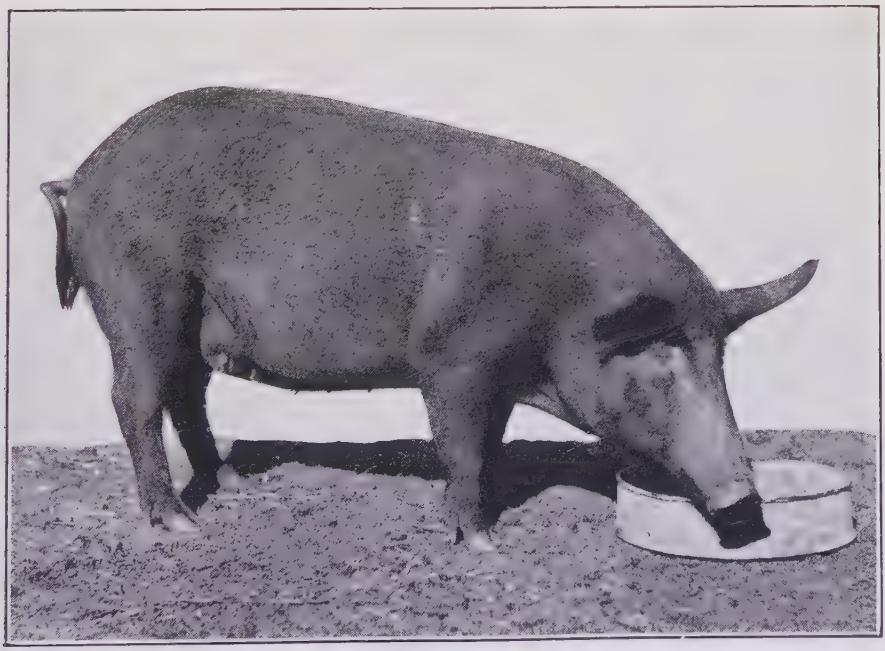

Plate 93.—A Young Tamworth Sow.

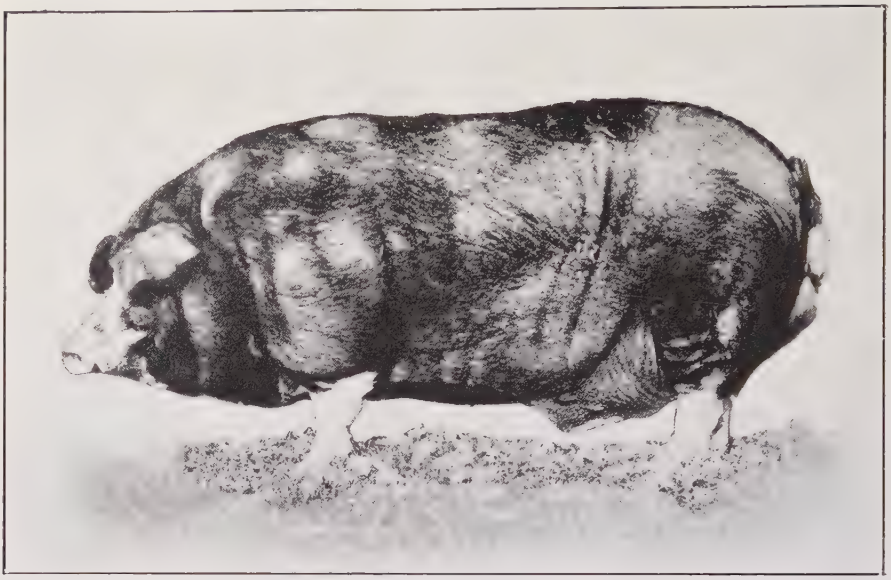

PLATE 97.—POLAND-CHINA BOAR.

PLATE 98.—POLAND-CHINA SOW

Photo: Dept. Agriculture and Stock.]

PLATE 99.—THE SCRUB BEEFWOOD. (Omitted from April Journal.)

A.—Inflorescence. B.—Seed Vessels. C.—Seeds. D.—Showing a seed inserted between two lamellae.

IMPROVING THE QUALITY AND PRODUCTIVENESS OF FRUIT AND FRUIT TREES.

By ALBERT H. BENSON, M.R.A.C., Director of Fruit Culture.

In the February number of the "Queensland Agricultural Journal" for 1898 an article dealing with the "Propagation of Fruit Trees," and contributed by the writer, was published. The article in question was a reproduction of a paper read at the meeting of the Australasian Association for the Advancement of Science, held in Sydney in January, 1898. After twenty-five years I see no reason to alter my opinions, but am again submitting the advice I then gave. I have no hesitation in saying that had this advice been acted upon the fruitgrowing industry of Australia would be on a more satisfactory basis than it is to-day, and the many diseased, useless, inferior, and unprofitable trees now cumbering the orchards in every State of the Commonwealth would not have been propagated, let alone planted. Unfortunately, the propagation of inferior varieties still continues, and the paramount importance of bud and stock selection is not realised; buds or grafts being frequently procured from the most accessible source irrespective of the vigour, health, and productiveness of the tree from which the scions are obtained or the vigour of the stock upon which the scions are worked. To-day there are many thousands of apple, citrus, and other fruits growing on the wrong stocks; that are lacking in vigour and that will never make a satisfactory or profitable tree capable of producing regular crops of the best quality. This is a very serious matter, for, on account of the enormous increase in the production of fruit, not only in Australia but elsewhere, there is a constantly increasing difficulty in obtaining profitable markets and there is practically no market for inferior lines.

The planting of inferior and non-productive varieties of fruit is inimical to the industry, and unless it is stopped will lead eventually to serious loss. American authorities recognise this, and for some years have been carrying out exhaustive tests to prove the value of bud selection, with the result that the trees produced by such selection are regular bearers of the highest quality fruit, thus confirming my original contention in every respect.

American nurserymen recognise the importance of bud selection and many are only using the wood taken from trees having a record for quality and quantity productiveness; in brief, from proved "stud" trees, so that purchasers of the trees worked therefrom are practically certain of having an orchard in which the trees can be depended upon to yield a satisfactory return of high quality fruit, instead of one containing a number of trees bearing fruit of very variable quality and very uncertain in the matter of production; in fact, an orchard such as is altogether too common in Queensland. It is fully time that our nurserymen made a serious attempt to improve the stamina and quality of the trees they propagate, so that when planted out permanently they are able to grow into vigorous trees possessing a good root system and capable of yielding a maximum crop of the highest quality fruit. This can only be brought about by the exercise of the greatest care in the selection of the stocks and scions—in brief, by systematic propogation, or, to use a stockman's term, "stud breeding."

Fruitgrowers have the remedy in their own hands, as once they let nurserymen know that they will only purchase trees of guaranteed quality worked from trees of proved excellence, they will get what they ask for, but as long as they accept anything offered to them by nurserymen they cannot expect much improvement.

Following is an extract from the article referred to ("Propagation of Fruit Trees," "Q.A.J.," February, 1898) and which holds as good to-day as when first written:—

The Selection of the Stock.

This is a matter of vital importance, and one that seldom receives the careful consideration it should, as not only should the stock be chosen that assimilates most readily with the scion, and thus forms a complete and perfect union with it, but it should also be the one that is best adapted to the soil in which the tree is to be permanently planted; and in addition to these qualifications, there is one other of even greater importance, and that is the constitutional vigour of the stock itself.

I am strongly in favour of exercising the greatest possible care in the selection of stocks possessing strong constitutions, as it is on the constitution of the stock that the future vigour, freedom from disease, and length of life of the tree largely depends. Seedlings make the best of all stocks—not seedlings raised indiscriminately, but seedlings that are grown from carefully selected seeds that have been obtained from vigorous healthy trees that are known to be constitutionally robust, as the

seedlings produced from such seeds are more likely to produce healthy vigorous stocks than those grown from seeds that have been taken indiscriminately from any fruits that are available. Stocks are often raised from cuttings or by means of root-grafting, but such never possess as good a root-system as the seedling, nor have they the same vitality or inherent vigour. But when it is desirable to produce stocks by these means, every care should be taken to obtain the cuttings from strong-growing, healthy, vigorous trees. Be particularly careful to obtain both seeds and cuttings from healthy trees, as many of the most troublesome diseases of fruit trees are transmitted from parent to offspring, especially in the case of citrus and stone fruits. These remarks do not refer to any particular variety of fruit, but to all fruits, as, no matter what kind of fruit you are propagating, if you wish to maintain a high standard of excellence, you must use selected stocks, and these stocks must be selected in the manner I have just described.

Selection of Scion.

In order to produce the best fruit (and by the best fruit I mean that which is of most value commercially, and which pays the grower best), it is absolutely necessary that the same care shall be exercised in the propagation of the tree as the successful breeder of stock takes for the raising of horses, cattle, sheep, or other live stock; and just as the successful breeding of stock depends on the careful selection of the sire and dam, so the successful propagation of the best fruit depends on the careful selection of the stock and scion.

One of the best known laws of Nature, both as regards the propagation of animals or plants, is that like produces like, and that by a careful selection of and propagating only from the best that both animals and plants become improved. This being so, it therefore stands to reason that the greater the care that is taken in the selection of the scion, be it bud, graft, or cutting, the greater the chance that the tree produced from such scion will produce fruit of equal quality to the parent tree from which the scion was obtained, and, if the stock has been selected as well, then that the tree resulting from the union of such stock and scion may be superior to the parent tree.

As the scion, when united with the stock, becomes eventually the entire fruit-producing portion of the tree, it is impossible to over-estimate the importance of selecting the best scions—for as the scion is so will the tree be. This is a point that is often overlooked by Australian propagators, as in many instances the only care that is taken is to see that the scion is of the desired variety that it is wished to propagate, irrespective of the source from which the scion has been obtained; and this, in my opinion, is largely the cause of the deterioration that is taking place in many of our standard varieties of fruits, especially those of the Citrus family.

Thousands of fruit trees of various kinds are annually propagated from scions that are more or less valueless, as they lack one or more of the following qualifications, which should always be taken into consideration when selecting the scion:—

Always select your scions from a perfectly healthy tree, as many diseases are transmitted by the scion.

Always select your scions from a tree that produces heavy crops of the best fruit.

Always select your scions from trees that are good growers and that possess a vigorous constitution. Never select a scion from any tree that is poor in any way—either a poor or uncertain bearer, a poor, uneven, or weakly grower, that is subject to any diseases that are directly transmitted, such as gum, curl-leaf of the peach, or small leaf of the lemon, or that is badly attacked by any scale insect or fungus—as such trees are usually constitutionally weak, for the weaker the constitution of the tree the more liable it is to disease. As to the scion itself, if a graft, see that the wood is properly matured, or, if a bud, then that the bud is full—viz., properly developed—as immature grafts or buds rarely produce vigorous trees.

One of the great questions the Australian fruitgrower has to deal with at present is to find a market for a large quantity of inferior and medium quality fruits, but, despite this fact, nurserymen are annually propagating thousands of trees of absolutely worthless varieties—trees which when they come into bearing will only produce fruit of inferior quality; and instead of gradually diminishing the output of rubbish, and thus relieving our markets of this unsaleable fruit, our growers continue to plant trees for the produce of which there is no demand, nor is there any chance of their being any, as throughout the world the demand is for first-class fruit, no matter whether it is fresh, dried, canned, or otherwise preserved.

It is therefore to the interest of every fruitgrower in Australia to obtain and plant out only the very best trees; and to obtain the very best trees, it is essential that only the best varieties be propagated, and that the care I recommend as necessary should be taken in the selection of the stocks and scions that are to produce these trees.

The Development of New and the Improvement of Existing Varieties of Fruit.

With the exception of selecting chance seedlings that have shown some special qualifications, such as earliness, productiveness, lateness, or freedom from disease, and propagating the same by budding or grafting, no systematic attempt has been made to produce fruits that are especially adapted to Australian conditions, or even to systematically improve the existing varieties of fruits. In my opinion, this is a matter of such importance that it should be made an especial study by the various Departments of Agriculture throughout Australasia. I am confident that we can produce fruits that will be more suitable to our conditions, and that will be better adapted for the markets for which they are grown—be they local, interstate, or foreign—than those that are being commonly grown at present. California owes her position, as the premier fruit-producing country on earth, to the fact that her growers have developed types of fruit that are especially adapted to her conditions and to the markets which she supplies; and that she has grown these fruits only in such districts as are most suitable to the development of each individual variety. Here, on the other hand, our growers have done little if anything towards the development of special types; and as to their confining their attention to the variety or varieties of fruits that are best adapted to their individual soil or climate, it is often one of the last things they have thought of, their orchards being more often conspicuous for the number rather than for the excellence of the varieties grown.

In addition to selection, there is the important question of developing new varieties of hybridisation, and this particular work opens up such a wide field for experiment that good results can only be achieved as the outcome of many years of extremely careful work, so that it is a matter entirely outside the scope of the ordinary propagator or fruitgrower, but is the province of a specialist such as Luther Burbank, of Santa Rosa, California. This is a matter that belongs by right to our Agricultural Departments, as it is more a public than a private question, for, no matter how skilled the operator may be, the production of a new variety possessing distinctly valuable qualities, not possessed by any existing variety, is not accomplished more than once in many thousands of experiments. Still when such a hybrid has been produced it is a great acquisition to the fruit industry, and of more or less commercial value to it.

There is, as I have before stated, a wide field for conducting experiments in the hybridisation of fruits, as we have many varieties which, though of especial merit in some particular, are yet of no commercial value owing to some other cause. Thus a tree may produce a fruit of exceptional quality which it is extremely desirable to have in quantity, but it may be either a very poor bearer, a stunted weakly grower, or very liable to disease; so that if a hybrid can be produced possessing the exceptional qualities of the original variety without its drawbacks, it is a decided gain. Or, to take another example, we have a fruit that possesses every good quality except that it is a bad keeper and shipper, and we cross it with a fruit that is an exceptionally good keeper and shipper, and the resulting hybrid possesses the good qualities of both parents. Thus we have again produced a fruit that is a decided gain and of commercial value to the country producing it.

The development of new varieties specially adapted to Australian conditions can only be achieved by systematic hybridisation, but the existing varieties of fruits may be improved by careful selection.

In conclusion, I may state that I have written these few notes on the Propagation of Fruit Trees in the hope of drawing attention to what I have felt for some time—viz., the necessity for our producing nothing but the best and for stopping the propagation of the large number of worthless varieties of fruits of all kinds that are always more or less of a drag on our markets and an injury to the fruit-growing industry of Australasia.

REPORT ON EGG-LAYING COMPETITION, QUEENSLAND AGRICULTURAL COLLEGE, APRIL, 1923.

The twentieth egg-laying competition at the Queensland Agricultural College commenced on 5th April. During the early part of the period cold and bleak winds, with light showers, prevailed, much to the detriment of the health and egg-production of the competitors, notwithstanding the fine quality of most of the birds sent to compete. A few pens were sent too young, and others contained sick birds, which would have been better left at home, as they do not improve matters for their breeders. Some of them are already in moult. The majority of the competitors look well, and should make a name for their owners. The following are the individual records:—

Competitors.	Breed.	April.	Total.
LIGHT BREEDS.			
Jas. Hutton	White Leghorns		100
*S. L. Grenier	Do.		94
W. A. and J. Pitkeathly	Do.		87
*C. H. Singer	Do.		86
*Rock View Poultry Farm	Do.		80
Beckley Poultry Farm	Do.		80
*J. W. Newton	Do.		80
*Oakleigh Poultry Farm	Do.		80
*J. W. Short	Do.		78
Jas. Harrington	Do.		77
*O. Goos	Do.		77
*N. A. Singer	Do.		77
*W. and G. W. Hindes	Do.		75
*R. C. J. Turner	Do.		74
*Ancona Club	Anconas		68
G. W. Rogers	White Leghorns		63
*Mrs. R. Hodge	Do.		59
C. Quesnell	Do.		56
*Arch. Neil	Do.		55
G. Marks	Do.		54
*G. Williams	Do.		54
F. Sparsholt	Do.		53
Hall and Chapman	Do.		53
*Mrs. L. Andersen	Do.		53
W. and G. W. Hindes	Brown Leghorns		52
*H. Fraser	White Leghorns		51
*J. M. Manson	Do.		50
Jas. Earl	Do.		46
E. Ainscough	Do.		44
*Bathurst Poultry Farm	Do.		44
*A. C. G. Wenck	Do.		37
*Mrs. E. White	Do.		31
*H. P. Clarke	Do.		30
W. Becker	Do.		30
*C. A. Goos	Do.		25
Parisian Poultry Farm	Do.		22
N. J. Nairn	Do.		16
J. Purnell	Do.		15
HEAVY BREEDS.			
*W. Becker	Chinese Langshans		102
R. Conochie	Black Orpingtons		84
J. R. Douglas	Do.		81
Beckley Poultry Yards	Do.		77
*Mrs. A. E. Gallagher	Do.		73

EGG-LAYING COMPETITION—*continued.*

Competitors	Breed	April.	Total.
HEAVY BREEDS—*continued.*			
*Jas. Hutton	Black Orpingtons ...	73	
*R. Burns	Do. ...	71	
*H. M. Chaille	Do.	67	
*E. F. Denms	Do. ...	63	
*Jas. Ferguson	Chinese Langshans ..	60	
*R. Holmes	Black Orpingtons ...	59	
*E. Walters	Do.	58	
Mrs. A. Kent	Do.	51	
*Jas. Potter	Do.	51	
*J. H. Jones	White Wyandottes .	50	
W. T. Solman	Black Orpingtons ...	42	
H. B. Stephens	Do. ...	41	
*Parisian Poultry Farm	Do.	35	
*T. Hindley	Do ..	35	
W. F. Ruhl	Do.	34	
V. J. Rye	Do.	33	
*Rev. A. McAllister	Do ..	32	
W. G. Badcock	Ch. Langshans	26	
G. E. Rogers	Black Orpingtons ..	25	
*C. C. Dennis	Do.	15	
F. J. Murphy	Do.	10	
Mos. Stephens	Do.	0	
Jas. Ferguson	Rhode Island Reds ...	0	
Jas. Ferguson	Plymouth Rocks ...	0	
Total	...	3,554	

* Indicates that the pen is being single tested.

DETAILS OF SINGLE HEN PENS.

Competition.	A.	B.	C.	D.	E.	F.	Total.
LIGHT BREEDS.							
S. L. Grenier	14	17	16	17	16	14	94
C. H. Singer	16	22	13	6	11	18	86
Rockview Poultry Farm	12	19	14	14	12	9	80
Beckley Poultry Yards	16	9	10	15	14	16	80
J. W. Newton .. .	14	17	16	2	14	17	80
Oakleigh Poultry Farm .. .	15	16	11	11	14	13	80
J. W. Short	13	12	12	18	16	7	78
O. Goos	11	16	16	12	8	14	77
N. A. Singer	12	20	18	12	7	8	77
W. and G. W. Hindes ..	6	18	10	3	18	20	75
R. C. J. Turner	4	19	16	14	4	17	74
Ancona Club	11	15	14	4	7	17	68
Mrs. R. E. Hodge	2	10	3	17	19	8	59
Arch Neil	9	4	3	12	17	10	55
Geo. Williams	15	17	0	14	0	8	54
Mrs. L. Andersen	2	14	13	17	5	2	53
H. Fraser	10	8	9	11	5	8	51
J. M Manson	3	7	10	14	7	9	50
Bathurst Poultry Farm	3	12	10	13	0	6	44
A. C. G. Wenck	5	0	5	9	5	13	37
Mrs. E. White	5	0	13	13	0	0	31
H. P. Clarke	12	0	7	0	5	6	30
C. A. Goos	0	16	7	0	0	2	25
N. J. Nairn	6	1	4	2	2	1	16
J. Purnell	3	0	2	3	4	3	15

EGG-LAYING COMPETITION—*continued.*

DETAILS OF SINGLE HEN PENS—*continued.*

Competitors.	A.	B.	C.	D.	E.	F.	Total.
HEAVY BREEDS.							
W. Becker	17	20	17	15	14	19	102
Mrs. A. E. Gallagher	16	18	5	16	17	1	73
Jas. Hutton	16	12	21	11	0	13	73
R. Burns	19	11	7	2	21	11	71
H. M. Chaille	8	16	18	16	0	9	67
E. F. Dennis	15	1	7	14	18	8	63
Jas. Ferguson	15	14	9	6	13	3	60
R. Holmes	13	3	19	3	12	9	59
E. Walters	18	19	0	8	6	7	58
Mrs. A. Kent	10	20	4	17	0	0	51
Jas. Potter	7	17	9	1	6	11	51
J. H. Jones	5	8	10	7	4	16	50
Parisian Poultry Farm	0	0	5	5	6	19	35
T. Hindley	7	6	9	13	0	0	35
C. C. Dennis	4	6	0	5	0	0	15

CUTHBERT POTTS, Principal.

DARLING DOWNS COMPETITION.

The Darling Downs Egg-laying Competition is being held under the auspices of the Toowoomba sub-branch of the N.U.P.B.A., conducted by Mr. Chas. E. Smith on his premises in South street, Toowoomba. During April Mr. J. Maude, of New South Wales, judged the birds in competition for keenness to type, each bird being classed as first, second, or third type, and he also selected a champion from each section, these honours going to Mr. J. H. Jones for White Leghorn, Mr. D. H. Dipple for Black Orpington, and Mr H. Becker's Langshan for any other variety. The total number of eggs laid for the month was 1,736, an average of 16.07 per bird. The following numbers represent the birds that have not yet started:—Nos. 25, 26, 36, 39, 41, 42, 55, 59, 60, in the Leghorn section; Nos. 91, 92, 98, 99, 106, 118, 123, in the Orpington section; and Nos. 61, 65, 66, 69, 70, 72, 78, 80 of the A.O.V. section. Three birds suffering from temporary ailments have recovered and have been returned to their respective pens. Following are the individual scores for April:—

WHITE LEGHORNS.

1	J. Hutton	27
13	D. Dipple	26
10	G. W. and W. Hindes	25
51	A. H. Walker	25
15	R. Cole	24
6	W. Grant	23
14	D. Dipple	23
30	W. Cummings	23
37	Parisian Poultry Yards	23
56	Enroh Pens	23
16	R. Cole	22
48	H. Hansbridge	22
53	C. A. Keon	22
2	J. Hutton	21
34	Mrs. F. Bliss	21
44	P. J. Fallon	21
54	C. A. Keon	21
21	J. W. Short	20
11	S. Chapman	19

WHITE LEGHORNS—*continued.*

20	R. W. Shaw	19
29	W. Cummings	19
4	J. H. Jones	18
7	G. Stilton	18
33	Mrs. F. Bliss	18
38	Parisian Poultry Yards	18
52	A. H. Walker	18
8	G. Stilton	17
12	S. Chapman	16
24	J. Goggins	16
47	H. Mansbridge	16
46	R. Turner	15
9	W. G. and W. Hindes	14
17	G. Lawrenson	14
19	R. W. Shaw	14
50	A. R. Petty	14
5	W. Grant	13
18	G. Lawrenson	12
49	A. R. Petty	12
57	J. W. Newton	12
22	J. W. Short	11
27	E. Wiles	10
28	E. Wiles	7
58	J. W. Newton	7
43	P. J. Fallon	6
32	Jas. Taylor	5
31	Jas. Taylor	4
23	Jas. Goggins	4
40	Vic. Brand	3
3	J. H. Jones	1
35	H. Manning	1
45	R. Turner	1

ORPINGTONS.

121	Jas. Hutton	29
88	Marville Poultry Farm	27
90	W. Wilson	26
109	D. Dipple	26
112	T. J. Carr	26
95	T. C. Ollier	25
110	D. Dipple	25
111	T. J. Carr	23
132	H. B. Stephens	23
127	E. Walters	22
103	C. F. Dennis	21
113	Ken. Macfarlane	21
115	Cliff Lavers	21
117	Mrs. L. Maund	21
120	Parisian Poultry Yards	21
129	G. Radford	21
128	E. Walters	21
114	Ken. Macfarlane	20
122	Jas. Hutton	20
84	Wombo Poultry Farm	19
108	R. Holmes	19
116	Cliff Lavers	19
131	H. B. Stephens	19

ORPINGTONS—*continued.*

86	T. J. Moloney	18
97	R. Burns	18
83	Wombo Poultry Farm	17
85	T. J. Moloney	17
89	W. Wilson	17
96	T. C. Ollier	17
107	R. Holmes	17
87	Marville Poultry Farm	16
126	E. C. Dennis	14
125	E. C. Dennis	12
94	H. Mansbridge	9
100	Mrs. G. H. Kettle	6
105	R. Rivett	6
103	G. Radford	6
93	H. Mansbridge	5
101	R. W. Shaw	5
102	R. W. Shaw	4
104	E. F. Dennis	4
119	Parisian Poultry Yards	2
124	G. E. Rogers	1

ALL OTHER VARIETIES.

76	W. Becker, Langshans	27
73	H. Dibbs, Langshans	23
64	T. J. Carr, S.W.	22
68	R. W. Shaw, B.L.	21
67	R. W. Shaw, B.L.	20
82	C. G. Warrian, Rocks	20
63	T. J. Carr, S.W.	15
71	J. W. Allatt, Silver Camp.	15
74	H. Dibbs, Langshans	9
75	W. Becker, Langshans	9
79	A. Le Pla, R.I.R.	9
62	Mrs. L. Maund, Col. W.	8
81	C. G. Warrian, Rocks	5
77	W. Paulsen, Rocks	1

THE NATIONAL UTILITY POULTRY BREEDERS' ASSOCIATION.

ALLOTMENT OF PENS, ZILLMERE COMPETITION, 1923-4.

WHITE LEGHORNS.

Pen Nos.	
1/2	Carinya Poultry Farm, Salisbury
3/4	T. H. Craig, Miriam Vale
5/6	P. J. Fallon, Brodribb street, Toowoomba
7/8	Oakleigh Poultry Farm, Sunnybank
9/10	R. C. J. Turner, Chamberlain street, Toowoomba
11/12	A. Neil, Cannon Hill
13/14	Enroh Pens, Pine street, Ipswich
15/16	W. J. Berry, Brickfield street, Lutwyche
17/18	A. W. Ward, Eskgrove street, East Brisbane
19/20	W. Witt, Villeneuve, Kilcoy Line
21/22	M. F. Newberry, Kedron Brook road, Wilston
23/24	Parisian Poultry Yards, Chamberlain street, Toowoomba
25/26	E. Stephenson, Bardon Poultry Farm, Paddington

WHITE LEGHORNS—*continued.*

27/28 H. T. Britten, Peary street, Northgate
29/30 G. and W. Hindes, Manly
31/32 H. Needs, Sunnybank
33/34 A. S. Walters, Doris street, Hill End, South Brisbane
35/36 J. T. Webster, Halaton, Bulimba
37/38 G. Williams, Salisbury road, Ipswich
39/40 J. Earl, Glenlossie, Kedron Brook road, Wilston
41/42 W. Wakefield, Soldier Settlement, Mount Gravatt
43/44 Kelvin Poultry Farm, Kelvin Grove
45/46 F. R. Koch, Cazna Poultry Farm, Laidley
47/48 R. D. Chapman, Montpelier street, Newmarket
49/50 J. Harrington, Aspley
51/52 Kidd Bros., Zillmere
53/54 H. Holmes, Hobart, Tasmania
55/56 G. Baxter, Lucknow road, North Ryde, Sydney, N.S.W.
57/58 H. Fraser, Rosewood
59/60 G. Scaletti, Mount Druitt, N.S.W.
61/62 Miss L. M. Dingle, Nudgee College Railway Station
63/64 S. Lloyd, Cornwall street, Thompson Estate
65/66 Robt. Duff, Waterworks road, Red Hill
67/68 J. and G. Green, Alma street, Clayfield
69/70 R. Shaw, Mayfield, Coorparoo
71/72 W. H. Forsyth, Willoughby, N.S.W.
73/74 A. Hodge, Kelvin Grove road, Brisbane
75/76 W. Shaffrey, Zillmere
77/78 W. Smith, Holmesbrook street, Grove Estate
79/80 W. Bliss, Forest Hill
81/82 J. E. G. Purnell, Annie street, Torwood
83/84 L. Andersen, Skew street, Sherwood
85/86 A. Cowley, Soldier Settlement, Enoggera

BLACK ORPINGTONS.

87/88 Parisian Poultry Yards, Chamberlain street, Toowoomba
89/90 Ken Macfarlane, Box 69, Toowoomba
91/92 Jas. Pryde, Chapel Hill, Indooroopilly
93/94 H. B. Stephens, Box 69, Toowoomba
95/96 Jas. Potter, Zillman road, Hendra
97/98 W. Shaffrey, Zillmere
99/100 S. Donovan, Murarrie
101/102 Enroh Pens, Pine street, Ipswich
103/104 L. Pritchard, Harte street, Chelmer
105/106 W. Smith, Holmesbrook street, Grove Estate
107/108 E. F. Dennis, Herston road, Kelvin Grove
109/110 T. Brotherton, Prince st., Thompson Estate
111/112 H. M. Chaille, Blinkbonnie, Esk
113/114 E. Walters, Lyon street, Moorooka
115/116 C. C. Dennis, Yeronga
117/118 E. C. Raymond, Brighton, Sandgate Central
119/120 J. Harrington, Aspley

OTHER VARIETIES.

121/122 Parisian Poultry Yards Toowoomba (Brown Leghorns)
123/124 J. Ferguson, Broadwater, Nanango (Anconas)
125/126 J. Ferguson, Broadwater, Nanango (Langshans)
127/128 A. S. Walters, Doris street, Hill End, South Brisbane (Barred Rocks)
129/130 R. A. Girling, Long Hill, Kelvin Grove (Black Minorcas)
131/132 W. H. Forsyth, Willoughby, N.S.W. (Silver Wyandottes)

A SUMMARY OF SOME EXPERIMENTS CARRIED OUT BY THE BUREAU OF SUGAR EXPERIMENT STATIONS.—VII.

The Director of Sugar Experiment Stations, Mr. H. T. Easterby, commenced this series in the May (1922) Journal, and in his opening article discussed deep cultivation experiments and tabulated comparative crop result from subsoiled and non-subsoiled fields. The second instalment, an account of results of irrigation experiments and the action of irrigation and manures upon the density and purity of sugar juices, appeared in the June (1922) issue. In the August number Mr. Easterby's notes covered experiments in fertilisation, and were followed in the succeeding issue by an account of distance experiments and resultant crops. In the October (1922) number the summary was continued with notes on the introduction and testing of cane varieties. In the February Journal experiments to determine if cane sets cut from arrowed canes have a prejudicial effect on the germination and subsequent yield were discussed. In his introduction to the Summary of Experiments above mentioned, the Director stated that a summary of the chemical work accomplished by the Bureau, to be prepared by Mr. George R. Patten, formerly Chief Chemist to the Bureau, would also be presented. Mr. Patten has now completed this summary, which entailed a great deal of elaborate work and occupied much time. The results will appear from time to time in the Journal until complete, when the whole summary will then be published in bulletin form.—Ed.

SOIL AND OTHER CHEMICAL ANALYSES.

Summarised by GEORGE R. PATTEN, Analyst, Agricultural Laboratory, Brisbane, formerly Chief Chemist, Bureau of Sugar Experiment Stations.

The average complete analysis of the soils of the sugar districts of Queensland presented in the following tables comprise all the sugar districts existing in 1904.

The magnitude of the analytical work entailed may be gauged by the fact that the number of soils analysed was 857. The sampling took a considerable time, as each sample consisted of four sub-samples totalling 3,428 sub-samples. For convenience of classification the sugar lands of Queensland were divided into three districts—viz., Cairns, Mackay, and Bundaberg—which were subdivided into sub-districts as follows:—

Series No. I. Cairns.—Mossman River, Cairns, Johnstone River, and Herbert River.

Series No. II. Mackay.—Burdekin Delta, Proserpine, and Mackay.

Series No. III. Bundaberg.—Bundaberg, Goodwood, Isis, Logan, Maryborough, and Moreton.

All this work was accomplished by the staff at the Sugar Experiment Station Laboratory, Bundaberg, during years 1901-1909.

The total analyses of the soil, together with agricultural analyses and plant food soluble in aspartic acid, is presented, the object of such analyses being to demonstrate in the first place the plant food immediately available, the acid soluble plant food which by process of weathering, &c., is gradually becoming available, and finally the analyses of the insoluble residue of the soils demonstrating the store of plant food locked up in the insoluble silicates which may in course of time gradually be added to the acid soluble plant foods.

Further tables appear including analyses of soils from Hatton in the Mackay district, and Rockhampton, and finally tables setting forth typical analyses of soil, solubility of plant food in various organic and mineral acids, and water capacity of the Queensland soils.

Subsequent tables present an interesting series of analyses from 1901 to 1922 of various fodders, analysis of the ash of sugar-cane, sugar-cane leaves, preserving action of chemicals on sugar-cane juice, experiments demonstrating comparison of the extraction of sugar from cane by the Laboratory Mill and sugar mill rollers. These experiments and analyses were carried out at the Sugar Experiment Station, Mackay, and at the Agricultural Laboratory, Brisbane, the results of the latter being supplied by courtesy of Mr. J. C. Brünnich, F.I.C., the Agricultural Chemist.

Attention is drawn to the low percentage of lime in the agricultural analyses in the districts from Mossman to Mourilyan, and the high magnesia ratio. The lime content is somewhat better on the Herbert River.

SERIES No 1.

CAIRNS (MOSSMAN).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	76·23	..	..	..
Moisture	1·82	..	..	..
Combustible matter	6·52	..	6·64	..
Silica (SiO_2) (insoluble)	..	70·41	54·70	58·57
Silica (SiO_2) (soluble)	..	14·61	11·31	12·12
Phosphoric acid (P_2O_5)	·11	·06	·15	·18
Chlorine (Cl)	·004	..	·004	·004
Iron oxide (Fe_2O_3)	3·65	1·41	4·80	5·16
Alumina (Al_2O_3)	10·21	8·71	17·16	18·43
Lime (CaO)	·26	1·04	1·06	1·19
Magnesia (MgO)	·50	·26	·71	·75
Potash (K_2O)	·53	2·05	2·13	2·28
Soda (Na_2O)	·20	1·09	1·09	1·17
	100·03	99·64	99·75	99·85

Acidic elements in the soils .. .. 70·87 per cent.
Basic elements in the soils .. .. 28·98 per cent.
Total nitrogen in the soils .. .. ·127 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0009	27
Lime (CaO)	·0659	1,977
Potash (K_2O)	·0137	411

KAMERUNGA (NEAR CAIRNS).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	89·01	..	..	..
Moisture	·87	..	..	..
Combustible matter	3·55	..	3·58	..
SiO_2 (insoluble)	..	89·92	80·74	83·74
SiO_2 (soluble)	..	4·81	4·32	4·48
P_2O_5	·14	·13	·25	·26
Cl	·003	..	·003	·003
Fe_2O_3	2·34	·36	2·68	2·68
Al_2O_3	3·01	2·66	5·42	5·62
CaO	·17	·32	·45	·47
MgO	·24	·26	·47	·49
K_2O	·28	·79	·99	1·03
Na_2O	·15	1·19	1·21	1·26
	99·76	100·44	100·11	100·03

Acidic elements in the soils .. .. 88·48 per cent.
Basic elements in the soils .. .. 11·55 per cent.
Total nitrogen in the soils .. .. ·097 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0014	42
Lime (CaO)	·0430	1,290
Potash (K_2O)	·0082	246

HAMBLEDON (NEAR CAIRNS).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	80·25	..	..	..
Moisture	1·45	..	..	..
Combustible matter	5·33	..	5·41	..
SiO_2 (insoluble)	..	79·64	64·81	68·50
Sio_2 (soluble)	..	9·18	7·47	7·89
P_2O_5	·15	·09	·23	·24
Cl	·002	..	·002	·002
Fe_2O_3	4·45	·81	5·18	5·47
Al_2O_3	7·04	7·77	13·42	14·18
CaO	·28	·42	·62	·66
MgO	·33	·30	·58	·61
K_2O	·47	1·15	1·41	1·50
Na_2O	·17	1·15	1·11	1·07
	99·92	100·51	100·24	100·12

Acidic elements in the soils .. .. 76·63 per cent.
Basic elements in the soils .. .. 23·49 per cent.
Total nitrogen in the soils .. .. ·124 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0013	39
Lime (CaO)	·0678	2,034
Potash (K_2O)	·0108	324

MULGRAVE (GORDONVALE) RED SOILS.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	70·43	..	..	..
Moisture	1·98	..	..	..
Combustible matter	7·15	..	7·29	..
SiO_2 (insoluble)	..	64·12	46·06	49·66
SiO_2 (soluble)	..	20·65	14·83	15·99
P_2O_5	·22	·04	·26	·28
Cl	·002	..	·002	·002
Fe_2O_3	7·18	4·12	10·28	11·08
Al_2O_3	12·13	9·05	18·87	20·34
CaO	·32	·71	·84	·90
MgO	·34	·64	·81	·88
K_2O	·40	·49	·76	·82
Na_2O	·17	·50	·53	·57
	100·32	100·32	100·53	100·51

Acidic elements in the soils .. .. 65·93 per cent.
Basic elements in the soils .. .. 34·58 per cent.
Total nitrogen in the soils .. .. ·127 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0009	27
Lime (CaO)	·1065	3,395
Potash (K_2O)	·0238	714

MULGRAVE (GORDONVALE) ALLUVIAL SOILS.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	78·20	..	..	..
Moisture	1·78	..	..	..
Combustible matter	5·72	..	5·83	..
SiO_2 (insoluble)	..	77·02	61·31	65·09
SiO_2 (soluble)	..	10·94	8·71	9·24
P_2O_5	·16	·06	·21	·22
Cl	·002	..	·002	·002
Fe_2O_3	4·70	·64	5·30	5·62
Al_2O_3	8·17	8·46	15·05	15·98
CaO	·27	·88	·98	1·04
MgO	·42	·30	·66	·71
K_2O	·40	·84	1·03	1·10
Na_2O	·14	1·36	1·22	1·22
	99·96	100·50	100·30	100·22

Acidic elements in the soils .. .. 74·56 per cent.
Basic elements in the soils .. .. 25·66 per cent.
Total nitrogen in the soils .. .. ·113 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0012	36
Lime (CaO)	·0972	2,916
Potash (K_2O)	·0100	300

GERALDTON (INNISFAIL) RED SOILS.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	42·05	..	..	..
Moisture	4·23	..	..	..
Combustible matter	15·78	..	16·47	..
SiO_2 (insoluble)	..	82·09	36·05	43·15
SiO_2 (soluble)	..	10·17	4·47	5·34
P_2O_5	·27	·07	·31	·37
Cl	·005	..	·005	·005
Fe_2O_3	16·52	2·54	18·37	21·97
Al_2O_3	20·47	3·60	22·86	27·36
CaO	·08	·09	·12	·15
MgO	·20	·08	·24	·29
K_2O	·17	·24	·28	·34
Na_2O	·20	1·46	·85	1·02
	99·97	100·34	100·02	99·99

Acidic elements in the soils .. .. 48·86 per cent.
Basic elements in the soils .. .. 51·13 per cent.
Total nitrogen in the soils .. .. ·173 per cent.

AVAILABLE PLANT FOOD SLOUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0006	18
Lime (CaO)	·0230	690
Potash (K_2O)	·0176	528

GERALDTON (INNISFAIL) ALLUVIAL SOILS.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	56·07	..	..	..
Moisture	3·95	..	..	..
Combustible matter	11·94	..	12·43	..
SiO_2 (insoluble)	..	61·84	36·08	41·21
SiO_2 (soluble)	..	24·48	14·31	16·34
P_2O_5	·23	·06	·27	·31
Cl	·005	..	·005	·005
Fe_2O_3	8·34	1·29	9·44	10·78
Al_2O_3	18·47	9·23	24·62	28·12
CaO	·13	·09	·19	·22
MgO	·44	·13	·54	·62
K_2O	·26	1·26	1·01	1·15
Na_2O	·15	1·42	·99	1·13
	99·98	99·80	99·88	99·88

Acidic elements in the soils .. .. 57·86 per cent.
Basic elements in the soils .. .. 42·02 per cent.
Total nitrogen in the soils .. .. ·165 per cent.

Available Plant Food Soluble in One Per Cent. Aspartic Acid.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0006	18
Lime (CaO)	·0398	1,194
Potash (K_2O)	·0145	435

MOURILYAN.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	57·23	..	..	..
Moisture	2·99	..	..	..
Combustible matter	11·93	..	12·20	..
SiO_2 (insoluble)	..	68·15	40·40	46·00
SiO_2 (soluble)	..	22·13	13·05	14·59
P_2O_5	·08	·13	·16	·18
Cl	·004	..	·004	·004
Fe_2O_3	8·71	·77	9·43	10·94
Al_2O_3	18·04	6·81	22·61	25·74
CaO	·20	·12	·28	·32
MgO	·43	·09	·49	·56
K_2O	·21	·81	·70	·79
Na_2O	·19	1·45	1·05	1·20
	100·03	100·46	100·37	100·32

Acidic elements in the soils .. .. 60·77 per cent.
Basic elements in the soils .. .. 39·55 per cent.
Total nitrogen in the soils .. .. ·164 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

[redacted]	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0006	18
Lime (CaO)	·0311	933
Potash (K_2O_5)	·0137	411

HALIFAX (HERBERT RIVER).

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	79·13	..	..	..
Moisture	2·35	..	..	..
Combustible matter	5·62	..	5·76	..
SiO_2 (insoluble)	..	67·68	54·84	58·17
SiO_2 (soluble)	..	14·10	11·42	12·12
P_2O_5	·13	·05	·17	·19
Cl	·002	..	·002	·002
Fe_2O_3	3·93	·66	4·56	4·84
Al_2O_3	7·52	11·27	16·84	17·86
CaO	·49	·54	·94	1·00
MgO	·51	·44	·88	·94
K_2O	·24	2·59	2·36	2·50
Na_2O	·14	2·89	2·49	2·64
	100·06	100·22	100·26	100·26

Acidic elements in the soils .. .. 70·48 per cent.
Basic elements in the soils .. .. 29·78 per cent.
Total nitrogen in the soils .. .. ·112 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

[redacted]	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0012	36
Lime (CaO)	·1035	3,105
Potash (K_2O)	·0138	414

INGHAM.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	84·13	..	..	..
Moisture	1·67	..	..	..
Combustible matter	4·89	..	4·99	..
SiO_2 (insoluble)	..	75·00	64·16	67·52
SiO_2 (soluble)	..	9·38	8·02	8·44
P_2O_5	·14	·06	·20	·21
Cl	·002	..	·002	·002
Fe_2O_3	2·85	·46	3·29	3·46
Al_2O_3	5·43	9·72	13·84	14·57
CaO	·32	·65	·88	·93
MgO	·31	·53	·77	·81
K_2O	·19	2·33	2·19	2·31
Na_2O	·14	2·15	1·99	2·09
	100·07	100·28	100·33	100·34

Acidic elements in the soils .. .. 76·17 per cent.
Basic elements in the soils .. .. 24·17 per cent.
Total nitrogen in the soils .. .. ·087 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0010	30
Lime (CaO)	·0508	1,524
Potash (K_2O)	·0121	363

RIPPLE CREEK.

Constituent Element.	Agricultural Analysis.	Insoluble Residue.	Absolute Analysis.	
		Insoluble in Hydrochloric Acid.	Water-free Soil.	Mineral Matter.
	Per Cent.	Per Cent.	Per Cent.	Per Cent.
Insoluble matter	79·46	..	..	..
Moisture	2·14	..	..	..
Combustible matter	5·83	..	5·95	..
SiO_2 (insoluble)	..	70·16	56·96	60·54
SiO_2 (soluble)	..	13·44	10·91	11·60
P_2O_5	·12	·14	·24	·25
Cl	·002	..	·002	·002
Fe_2O_3	3·97	·77	4·67	4·97
Al_2O_3	7·37	9·29	15·07	16·02
CaO	·46	·86	1·17	1·24
MgO	·51	·69	1·08	1·15
K_2O	·24	2·56	2·32	2·47
Na_2O	·13	2·50	2·17	2·30
	100·33	100·41	100·54	100·54

Acidic elements in the soils .. .. 72·39 per cent.
Basic elements in the soils .. .. 28·15 per cent.
Total nitrogen in the soils .. .. ·106 per cent.

AVAILABLE PLANT FOOD SOLUBLE IN ONE PER CENT. ASPARTIC ACID.

	Per Cent.	Lbs. Per Acre.
Phosphoric acid (P_2O_5)	·0009	27
Lime (CaO)	·0908	2,728
Potash (K_2O)	·0171	513

THE FARMERS' FURRED AND FEATHERED FRIENDS.

"The Animals and Birds Act of 1921."

The following particulars are published for general information:—

All wild animals or birds not named in the subjoined Schedules are totally protected during the whole year throughout Queensland.

SCHEDULE I.—ANIMALS THAT ARE NOT PROTECTED.

All introduced wild animals, including Fox, Rabbit, and Hare
All reptiles
Bandicoot (all species)
Bat or Flying-fox (all species)
Dingo
Kangaroo (all species, but not the Tree Kangaroo)
Native Cat (all species)
Paddymelon
Rat (all species)
Wallabies (all species)

BIRDS THAT ARE NOT PROTECTED.

Budgerigah or Shell Parrot
Cockatoo Parrot or Quarrion
Cormorant or Shag (all species)
Crow and Raven
Currawong or Scrub Magpie (Bell Magpie)
Galah or Rose-breasted Cockatoo
Goldfinch (introduced)
Indian Dove (introduced)
Indian Myna (introduced)
Long-billed Cockatoo or Corella
Rosella Parrot (all species, including Crimson Parrot)
Sparrow (introduced)
Starling (introduced)
White Cockatoo (all species)

SCHEDULE II.—BIRDS PARTIALLY PROTECTED.

Brush or Scrub Turkey
Bustard or Plain Turkey
*Coot (Redbill, &c.)
*Emu
Finch (all native species except Painted or Gouldian Finch)
Goose and Duck (all species, excluding Black Swan)
King Parrot
Lorikeet or Honey Parrot (all species)
Native Hen
Pigeon and Dove (all wild species, except "Squatter" and "Whampoo")
Plover
Quail (all species)
Redwing Parrot
Ringnecked Parrot
Sea Curlew and Sandpiper

In District No. 1 (South Queensland), from the first day of September in each year to the thirty-first day of March in the following year, inclusive.

In District No. 2 (North Queensland), from the first day of December in each year to the thirty-first day of May in the following year, inclusive.

*Provided that for Emus on prickly-pear infested land, and Coots in Northern Sugar Districts, the Close Season shall be from the first to the seventh day of July in each year, inclusive.

LIST OF SANCTUARIES WITHIN WHICH THE DESTRUCTION OR CAPTURE OF NATIVE BIRDS OR ANIMALS (WHETHER PARTIALLY PROTECTED OR OTHERWISE) IS PROHIBITED DURING THE WHOLE YEAR.

Archer (property of H. M. Jones)
Barambah Creek
Barron Falls (National Park)
Barron Shire (roads, reserves, and unalienated lands in the Shire of Barron)
Bellenden-Ker (Reserve for Native Fauna)
Blue Mountain Holding, Mackay
Boonara
Bowen (Denison Park)
Bribie Island
Bunya Mountain (National Park)
Burdekin Weir
Cabbage Tree Creek Reservoir and Catchment Area
Calliope River (Water Reserve)
Calliungal (Water Reserve R. 38)
Capricorn Group of Islands
Charters Towers (Reeve's Lake, part of Lolworth Creek, Reed Beds, and La Batt's Lake)
Chelmer Recreation Reserve
Coochie-Mudlo
Cressbrook
Doonela Lake
Dugandan (property of Mr. McConnel)
Eagle Junction (Kalinga Park)
Eidsvold Camping and Water Reserve
Emu Park (Town of Emu Park)
Enoggera Reservoir and Catchment Area
Etheridge Goldfield (Cumberland Dam)
Flaggy Creek Timber Reserve
Gold Creek and Moggill Creek Drainage Area
Gooburrum Shire (roads, reserves, and unalienated lands)
Gracemere (R. S. Archer's property)
Great Keppel Island
Hamilton Golf Links
Hinchinbrook, Barnard, Raine, Eva Islet, Agnes Islet, Channel Rock, Goold and Garden Islands
Hornet Bank (W. C. Mayne's property)
Houghton River (Horseshoe Lagoon)
Jarvisfield (Church Lagoon)
Jarvisfield (Sheep Station Creek)
Jarvisfield (Red Lily Lagoon)
Jordan Goldfield (3,600 acres)
Kuranda (Monamona Mission)
Lake Clarendon
Lake Murphy
Lamington National Park
Mackay Town (roads, reserves, and unalienated lands)
Mackay (Denman's Waterhole)
Mackay (Orphanage Swamp)
Magnetic Island
Malanda (J. English's property)
Malanda (swamp of 160 acres)
Maleny (properties of A. J. Thynne, A. Marshall, and A. W. Thomason)
Manumbar and Kilkivan (Timber Reserve)
Mareeba (Pasturage Reserve)
Maroochy Shire
Mount Cooroy and Inlet, Noosa River
Mount Coot-tha Reserve
Mount Glorious (G. Lee's property, near summit)
Mount Morgan—Dee River (Mount Morgan Gold Mining Company's property)
Mud Island
North Keppel Island
Nudgee Waterhole
Peel Island
Pentland Town Reserve
Point Danger (foreshores of ocean two miles back from portion 2, parish of Gilston, to Point Danger)
Pumice Stone Channel
Redcliffe Shire
Rewan Stud Farm for breeding Police horses
Rockhampton (Jardine's Lagoon)
Rockhampton (Murray's Lagoon)
Rockingham Bay (the islands therein)
Seaforth and adjacent islands
Stradbroke Island
Stuart River
Taylor, parish of (W. Gutteridge and W. E. Hammond's properties)
Taroom (Tualka Creek Water Reserve)
Tingalpa Shire
Toowong (Sir R. Philp's property, Toowong Sports Ground, and adjoining land)
Toowoomba (Jubilee Park)
Toowoomba (One-tree Hill)
Toowoomba (Picnic Point)
Toowoomba (Redwood Park)
Toowoomba Rifle Range
Townsville (Abattoir Reserve)
Townsville, county of Wilkie Gray, parish of Hinchinbrook (Wm. Young's property)
Townsville (German Garden Lagoons and adjoining swamps)
Townsville (Pink Lily Lagoon)
Valley of Lagoons Holding
Wynnum, Town of
Widgee Shire
Yaamba (late P. F. Macdonald's property)

GENERAL PROVISIONS.

Offences against the Act, for which severe penalties are provided, include—

Trapping or dealing in native birds or animals without a license. A trapper's license costs 5s., and a dealer's license 10s. They may be taken out at the office of the nearest Clerk of Petty Sessions.

Capturing or killing a partially protected wild bird or animal during the close season.

Capturing or killing a totally protected wild bird or animal at any time.

Capturing or killing a totally protected or partially protected wild bird or animal at any time in a sanctuary.

Interfering with any notice under this Act.

Taking the eggs of any protected or partially protected bird.

Using poison for killing Opossums or Native Bears.

Using acetylene lamp or similar torch in the killing of Opossums or Native Bears.

The following are the maximum numbers one individual shooter can kill in any one day:—

Wild Ducks	20
Wild Geese	10
Quail	25
Pigeons (except Squatter and Whampoo)	10
Plain Turkeys	2
Scrub Turkeys	2
Plovers	10

FRUIT FLY CHECKED BY COLD STORAGE.

An Interesting Experiment Produces Highly Satisfactory Results.

In order to determine the possibility of destroying the larvæ and eggs of fruit flies present in fruit grown in the Stanthorpe district, some twelves cases of apples were placed in cold store in Brisbane on the evening of the 26th March. Samples of these fruits were submitted daily to the Government Entomologist and Pathologist, with the exception of the period embraced by the Easter holidays, and the following is a precis of a report submitted by Mr. Henry Tryon, Government Entomologist, to the Fruit Branch respecting same:—

"Of the apples placed in cold storage, 34 per cent. manifested fruit fly infestation. This infestation was represented exclusively by insects either in the egg phase of life or by young maggots 1 to 1½ mm. in length that had recently hatched from eggs. These insects survived and grew slowly until at least the expiration of two or three days with augmented damage, but seldom if ever attaining the degree to render the fruit unsaleable. They had, however, all died at a date between 30th March and 5th April, indicating that the duration of the cold storage necessary to destroy them was not less than four days or more than eight days. The temperature of the cold store fluctuated from 34 to 42 deg. Fahr. As a result of this experiment it is proved that fruit fly larvæ infested fruit and fruit fly damage in fruit may be brought to a standstill by cold storage for a period of less than ten days, possibly much less." The results obtained are highly satisfactory, as in the opinion of the officers of the Fruit Branch it will now be possible to prevent much of the serious damage that takes place in the case of such apples as Gravenstein if they are placed in cold store in the earlier stages of their infestation, and fruits so treated will not deteriorate to any extent and meet with a ready local sale.

A CORELESS APPLE—AN AMERICAN DISCOVERY.

Apples without cores or seeds are promised by a discovery announced at Abbotsford, Canada. According to the announcement, a seedless and coreless variety of Fameuse apple has been developed, which differs but slightly in shape from an ordinary Fameuse by being longer, and flatter at the ends, but with the typical colouring and flavour. Except for a slight marking on the flesh, which outlines the situation of the core in an ordinary apple, there are neither core nor seeds. The apples were developed in an orchard at Abbotsford, and the discovery that they were out of the ordinary was an accident. They had come from a new block of Fameuse about eight years old, bearing for the first time in market quantities. The discovery was made while grading for market, but unfortunately no record was kept of the tree or trees producing the new fruit, and it will not be before another harvest that steps can be taken for its commercial development.

NEW WHEAT TRIALS.

SUMMARY OF RESULTS—SEASON 1922.

For a number of years the Department of Agriculture and Stock has carried on a system of wheat-breeding and selection for the purpose of improving existent varieties. Good work has been accomplished in the last decade, particularly at the Roma State Farm, where Mr. R. E. Soutter carries on the duties of plant breeder and manager. As a result of carefully designed work a number of new strains of wheat have been evolved, and the practice was followed of testing these under field conditions at the State Farm, also throughout the main wheatgrowing districts in the State.

Co-ordinated work of this description between the plant breeder and field officers of the Department has resulted in the segregation of a number of promising strains of wheat, which show unmistakably that they possess certain field characteristics markedly superior to those commonly found in varieties now in general cultivation.

Concurrently with the field trials in different districts, milling tests were carried out by the Agricultural Chemist to determine the nutritive and flour-yielding qualities of the varieties selected under the improvement system, in order that nothing but the best might be brought into cultivation. It is to be generally conceded that many of the varieties of wheat in cultivation throughout the State could be improved, and that the elimination of varieties such as these would have an effect of engendering a greater feeling of security in wheatgrowing as an occupation if other and superior kinds could be grown in their place.

To secure the co-operation of wheatgrowers, a scheme was outlined by this Department and put before the growers' representatives on the Wheat Board, who unanimously decided to adopt the system of the classification of the State into districts and the allotment thereto of varieties to suit representative soils and conditions common to the respective localities.

The next step decided upon was the active co-operation of members of the Wheat Board and officers of the Department of Agriculture in respect to the selection of sites in different districts where the season's trials could be carried out. Provision was also made that seed wheat from the resultant crops should be made available to the grower and the surplus employed for extending the cultivation of the particular variety, the Wheat Board in this latter connection undertaking to carry out a system of cleaning and grading the grain at their central depôt near Toowoomba.

It is generally recognised that considerable reduction could be effected in the number of varieties of wheat in general cultivation, which are said to exceed three score in number. Standardisation of types of Queensland-grown grain is being aimed at, so that only those varieties conforming to same may be eventually grown on a commercial scale. Last wheat season proved to be a dry one; in fact, the wheats under review were grown on a rainfall ranging from a minimum of 1 inch to a maximum of 4 inches, experienced during the growing season.

Another factor operating against the success of the wheat trials was the fact that good rains for germinating the seed were not experienced at the ordinary sowing season, and planting operations were in consequence delayed fully a month.

The undermentioned record of yields was obtained by the Department from growers:—

48	acres of	"Roma Red No. 2"	averaged	27 12/60	bushels pr. ac.
36	" "	"Cedric No. 2"	"	25 43/60	" "
163	" "	"Warchief No. 2"	"	22 22/60	" "
73	" "	"Roma Red No. 5"	"	21 37/60	" "
134	" "	"Novo No. 5"	"	21 24/60	" "
69	" "	"Roma Red No. 7"	"	20 37/60	" "
Total 523	acres.		Averaged	22 32/60	" "

Plate 100.—A Cotton Field at Pullen Vale, near Brisbane. Mr. Hugh McMartin's Plantation.

Plate 101.—Cotton on Mr. E. Arndt's Farm, Thornton, Laidley.

PLATE 102.—CATTLE ON THE BURNETT, NEAR GAYNDAH.

PLATE 103.—MR. HARRY LEGGATT, A REID'S CREEK (GAYNDAH) PIONEER, AND THE WAGGON WITH WHICH HE OVERLANDED FROM ADELAIDE NEARLY FORTY YEARS AGO.

Plate 104.—A Burnett Cotton Crop.
Mr. Thos. Gishford's Farm on Barambah Creek, near Gayndah.

Plate 105.—The Bountiful and Beautiful Burnett.
Outlook from Northern Escarpment, Binjour Plateau.

THE PINEAPPLE TRADE—CAUSE OF DAMAGE—CARELESS HANDLING.

During recent years pineapple production in Queensland has increased to a very marked extent and large quantities of the fruit are sent to the Southern markets. Unfortunately, the pineapples often arrive in New South Wales in very bad condition, and whilst recently in Sydney, Mr. W. Rowlands, Queensland Government Packing Instructor, had his attention drawn to the matter. He has now reported to the Department of Agriculture and Stock as follows:—

"It was pointed out to me by those dealing with pineapples that for the last eight years this fruit has been arriving in more or less bad condition, especially during February, March, and April of each year, and so far nothing has been done to remedy the trouble. Agents stated that growers doubt their word when informed of the condition of their pineapples on arrival. On inquiry I ascertained that between 400 and 500 cases weekly are lost in repacking, and as pineapples in good order are realising 10s. to 11s., the loss to Queensland growers has been considerable. One Sydney agent estimates his loss at £60 weekly. Through the courtesy of several agents who handle pineapples I was given assistance to open every consignment for my inspection, and out of thirty lots three consignments only opened up in perfect condition. On close examination I was able to see that the pineapples in good order had been cut from the plant, while the bad conditioned pines had been broken off. My conclusion was that the pineapples arriving in good condition had been cut from the plants with ½-inch stems; on the other hand fruit arriving in bad order had been broken off and handled carelessly.

"I at once telegraphed to Mr. G. Garrad, of Woombye, to send pineapples with longer stems and to cut them. Mr. Garrad replied that he was forwarding some cases as usual and some as I suggested. This fruit was examined by me on arrival, and it was found that the pineapples with long cut stems were in perfect order, while the pineapples sent as usual were in very bad order indeed. Since, several other consignments cut as suggested have arrived in good order. A Woombye grower in Sydney stated that it was not usual in his district to cut pineapples, but to break them off. He has returned determined to cut all pineapples in future.

"My opinion is that when growers are breaking off pineapples they injure the centre of the fruit and immediately decay sets in. It is common to see half green pineapples rotten at the base. I would suggest that all pineapple growers be notified to cut pineapples with at least ½-inch stem and not to break them off under any consideration; to handle all pineapples for interstate trade as carefully as possible, and not to 'bulge-pack' this fruit."

PLATE 106.—A PULLEN VALE FALLING, NEAR INDOOROOPILLY, BRISBANE.

Plate 107.—A Prize-winning Exhibit, Royal Agricultural Show, Sydney. 1923.

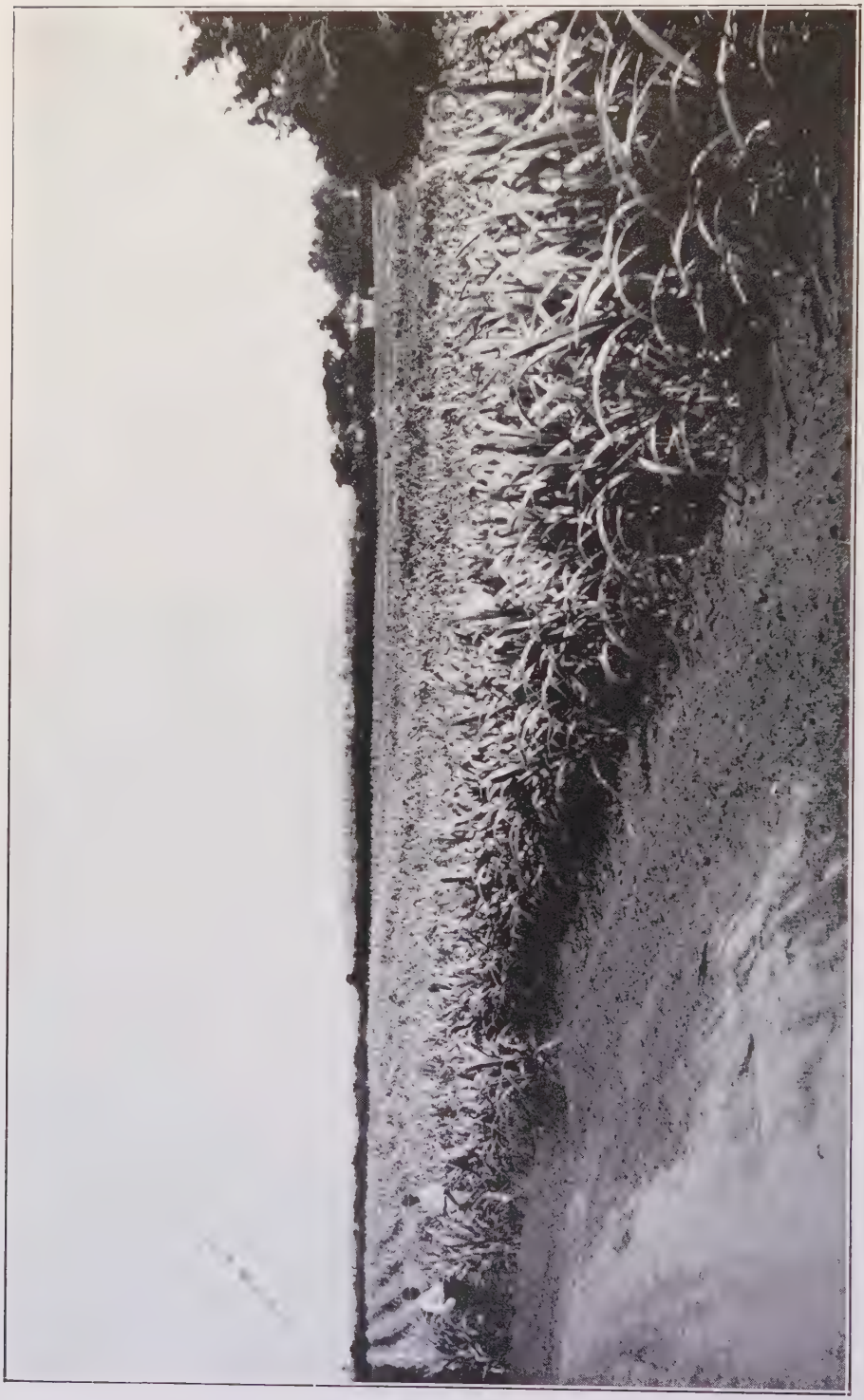

PLATE 108.—PLANT CANE, SUGAR EXPERIMENTAL STATION, MACKAY.

General Notes.

Native Bears and Opossums.

A notice has been published extending the close season for native bears and opossums until the 31st May, 1923. It is, of course, possible that this close season may be still further amended or extended.

Departmental Appointments.

The resignation of James M. Gibson as Cangrowers' Representative on the Racecourse Local Sugar Cane Prices Board has been accepted, and Robert S. Stevens has been appointed in his stead. Mr. F. C. Henk, of Palmwoods, has been appointed an Honorary Inspector under "*The Diseases in Plants Act of* 1916."

Fruit Industry—Lantern Slide Lectures and Fruit Packing Classes.

Fruitgrowers of the North Coast districts are now receiving a good deal of attention by way of horticultural education. The Chief Instructor in Fruit Culture (Mr. J. M. Ward) has been visiting a number of the fruit districts and delivering lantern slide lectures, and giving practical advice to individual orchardists. The chief subjects dealt with included the judicious selection of approved stocks and buds from proved productive trees producing the correct type of fruit; cultivation; manuring; agricultural education; organisation. Each subject was admirably illustrated with lantern slides. The lectures are being extended throughout the various fruit centres.

At the end of some of the lectures demonstrations were given by the Government Packing Expert (Mr. W. Rowlands) in packing oranges into the case to be adopted next year; the dimensions of the case in question are 20 inches long by 11½ inches wide by 10 inches deep (inside measurements). All who saw the case packed expressed satisfaction with it.

Packing classes for school children are to be conducted throughout the fruit season. The first of these was started at Buderim on 8th May, and was to be followed by others at Palmwoods, Mapleton, Nambour, Woombye, Montville, Yandina, and other centres. Growers are giving practical assistance to this class of instruction by way of finding packing sheds, fruit, cases, &c., and otherwise giving the subject their general support. After the students have packed the fruit it will be ready to be shipped to any market. Between forty and fifty of such classes have been in active operation in Tasmania during the past three years, and have proved most successful, and there is every reason to consider they will be of equal success in Queensland.

A Warwick Mill and the State Wheat Board.

In the "Courier" of the 17th instant a paragraph appeared, emanating from Warwick, relating that the Warwick Co-operative Farmers' Milling Company, having worked almost continuously for over two years, had now been compelled to reduce operations to one shift, and laying the responsibility for this upon the State Wheat Board. It was also stated that existing regulations were in favour of the Brisbane mills, which were obtaining wheat at 5s. 3d. a bushel compared with the Board's price of 6s. 5½d. a bushel. Further, a charge was made that the Brisbane mills could lay down flour in Warwick at 30s. a ton cheaper than the local article.

The Acting Minister for Agriculture, Mr. Huxham, communicated with the Wheat Board immediately the paragraph appeared, and the Board characterises as absurd and without foundation the statement that flour could be laid down in Warwick at 30s. a ton cheaper than the local article.

That the Brisbane mills are handling large quantities of Southern wheat at 5s. 3d. a bushel is not a fair way of stating the matter. The price quoted is the New South Wales price, and to it has to be added freight by sea, handling, and other charges—which would bring the State Wheat Board's price of 5s. 8d. a bushel, not 6s. 5½d. as stated in the article, in favourable comparison with Southern prices. As a matter of fact, the Warwick Farmers Milling Company had been allotted by the State Wheat Board more than its quota out of the wheat available from the last harvest.

Sugar Assessment.

An Order in Council under "*The Regulation of Sugar Cane Prices Acts*, 1915 *to* 1921," has been issued to the effect that the assessment to be levied on every ton of sugar-cane received at any mill on and after the 11th May, 1923, is fixed at 2d. per ton. Further, the Minister has levied an assessment at the rate of ½d. per ton on every ton of sugar-cane received at sugar-works during the season 1923-24 under "*The Sugar Experiment Stations Act of* 1900."

The Pink Boll Worm.

The same report states that the pink boll worm (*Pectinophora gossypiella* Saunders) of cotton is even more dangerous as a cotton pest than the cotton boll weevil, and is reported as occurring in small areas in Texas, Louisiana, and New Mexico. Accidentally introduced into the Southern States, it is adding to the difficulty of producing cotton in States already infested with the boll weevil. The Federal Horticultural Board has undertaken eradication measures in co-operation with the States concerned. Quarantines, both State and Federal, have been issued and effectively enforced. California Quarantine Order No. 39 applies to pink boll worm as well as to cotton boll weevil.

The Cotton Boll Weevil: Its Spread in American Cotton Country—How California Keeps Free.

In the report of the Bureau of Plant Quarantine (Third Report of the Californian Department of Agriculture, Monthly Bulletin, November-December, 1922) the history and habits of the cotton boll weevil (*Anthonomus grandis* Boh.) are briefly discussed. Discovered in two counties in the southern end of Texas in 1894, the weevil has now become established in every southern cotton-growing State, where the damage is estimated to be well in excess of 200,000,000 dollars annually. During the year 1921 the insect spread to 66,661 square miles of new territory, and since in Arizona there is a variety of cotton boll weevil (*Antonomus grandis* var. *thurberiæ*) infesting wild cotton in the mountainous regions, California is the only cotton-growing State in the Union free from every form of cotton boll weevil. This position is being strenuously maintained. A strong and drastic Quarantine Order (No. 32) is being rigorously enforced, and this is assisting materially in preventing an incursion of the cotton boll weevil into California.

How to Pick a Layer and Breeder.

Mr. W. Hindes, of Manly, lectured very informatively before a meeting of the National Utility Poultry Breeders' Association recently. White Leghorn and Black Orpington pullets were used for purposes of demonstration. In each case, one bird was a very good and the other a poor specimen of the breed, and this enabled the lecturer to compare good and bad points in each breed. The lecturer commended the trap-nesting method of testing layers, as the initial expenditure in erecting single-test pens limited the volume of work considerably. Continuing, the lecturer said that heavy egg-production was an inherited factor, the male bird must be prepotent. To prove whether the bird had this characteristic it was necessary to wait for some time until the progeny had been tested. If results were satisfactory the bird could then be used for three or four more seasons. In Mr. Hindes's opinion it is a grave error to follow the practice of many breeders by discarding the male bird after the first season. After a little experience, the lecturer stated, it became almost an instinct to pick layers as they pass in front of one. Handling and measuring could then be resorted to, if desired, merely to confirm one's opinion. The characteristics to look for were found first in the head and eye and then in body conformation. Of course, vigour and capacity were absolutely necessary. Mr. Hindes's observations proved that the best layers were usually a little flat breasted and flat sided, but very deep behind. He did not like a bird pinched towards the abdomen or narrow across the back. The vitality of a flock must be retained if heavy egg production is desired. This can be done by mating a slightly larger female than one would select for a laying competition with a fair or medium-sized cockerel from the fastest layer procurable. The lecturer liked fine texture in comb, which should not be too large or too thin. If the latter, the combs in the male progeny would be liable to droop over on one side. Birds with extra long and fine pelvic bones, he considered to be lacking in stamina. They might lay well for say fifteen months, while birds with stouter pelvic bones, other things being equal, he found, laid well for three or four seasons. Straight pelvic bones are desirable.

Agricultural Education—Activities of the Queensland University.

On 9th August, 1916, on the motion of Mr. J. D. Story, the senate of the University carried a resolution that, as the question of the primary industries is closely interwoven with post-war problems and a good system of agricultural education will be helpful in the development and expansion of the primary industries of Queensland, it is desirable that agricultural education should be carefully organised and developed.

The senate at the same time appointed a select committee, under the chairmanship of Mr. Story, to inquire into and report upon the whole question of agricultural education.

The committee, in its report, dealt exhaustively with the types of employers and employees who would be benefited by a systematic training under a suitable scheme of agricultural education, and also with the benefits which would accrue to the State as a whole. In its conclusions, the committee commented favourably on the work which was then being done in the recently established rural school at Nambour, and strongly recommended the establishment of similar schools in other agricultural centres as a first step towards a general scheme of agricultural education for the State. The committee also recommended that steps should be taken as early as practicable to organise the work of higher agricultural education on a diploma course basis, which would lead ultimately to the development of a full degree course in agriculture. However, in the absence of funds for the purposes, the senate has not been in a position to take any practicable steps towards that end. Recent developments in regard to the agricultural activities of the State have again revived the question, and the investigations made by Mr. Story during his visit to California towards the end of last year have proved that the recommendations of the select committee were substantially sound, and that a comprehensive system of agricultural education should form an inseparable part of any scheme for the expansion of these industries.

At the first meeting of the senate after his return to Queensland Mr. Story submitted a memorandum emphasising the need for the suitable training of future agriculturists, instructors, researchers, and leaders of the industry generally. He also advocated suitable provision for scientific investigation and research. His recent inquiries in California showed that a Department of Agriculture is regarded as a very desirable department in a University, particularly in a State which is mostly dependent upon the primary industries. They also showed that to enable a University to deal satisfactorily with the educational and research work of agriculture an area of not less than 600 acres was required, and that such an area, if it cannot be actually part of the University domain, should be within forty-five minutes' journey by conveyance of the University.

Finally, the following resolutions (amongst others) were carried by the senate:—

(*a*) That the memorandum submitted by Mr. Story on the question of the organisation and development of agricultural education in Queensland be received and particulars contained therein noted.

(*b*) That, seeing that it is not practicable at the present time to establish a Faculty of Agriculture or a Department of Agriculture, steps be taken as soon as possible for the institution of a Diploma of Agriculture.

(*c*) That a survey be made as to the directions in which the research work of the University could be extended so as to include those matters of economic importance to the primary industries, and concerning which work is not being done by the Commonwealth Institute of Science and Industry.

(*d*) The possibility of co-operation with the Council of Agriculture, with a view to the council's assisting financially in regard to research work which the council might ask the University to undertake.

(*e*) That a committee, consisting of Professor Richards and Professor Goddard (of the University staff), Mr. Riddell (assistant chief inspector), Mr. F. C. Thompson (principal of the practising school), and Mr. Hamlin (who succeeds Professor Johnston as officer in charge of the prickly-pear experimental station), be appointed to inquire into and report upon the whole question of the establishment of a Diploma of Agriculture.

(*f*) That a site of sufficient area for the practical work of a Faculty of Agriculture be secured as soon as possible.

Seed Cotton—Further Encouragement to Growers.

In January last an announcement was made that, for the year ending the 31st July, 1924, the advance to be made by the Government for seed cotton delivered at the nearest ginnery, or as might be otherwise arranged, would be, for seed plant cotton of good quality free from disease and defects, of 1¼-inch staple, 5½d. per lb., and for less than 1¼-inch staple, 4½d. per lb. The advance to be limited to areas not exceeding 50 acres.

The Minister for Agriculture (Hon. W. N. Gillies) now desires to make it clearly known to growers that the Government, owing to the drought and the consequent circumstances of the industry, has decided to make the advance for the year ending the 31st July, 1924, as follows:—

For seed plant cotton of good quality, free from disease and defects, of 1¼-inch staple	5½d. per lb.
If of lesser staple than 1¼ inch	5d. per lb.

The other conditions issued in January last in relation to the advance to remain.

Thus it will be seen that growers will, owing to this decision of the Government, be in a better position to make their arrangements for the coming planting. No alteration has been made in relation to the advance for seed cotton of 1¼-inch staple, and for seed cotton of lesser staple the advance has been increased by ½d. per lb. over the January conditions, and the encouragement thus given should ensure an area under cotton that will be considerably in excess of the area planted in 1922-23, with a great increase in the harvest, if there is an improvement in the season on that of last year that can be reasonably looked for.

The Bacon Industry on the Downs.

As an illustration of the progress of the bacon industry on the Downs, it is stated that last year the Downs Co-operative Bacon Company treated 31,842 pigs, of which 31,386 were baconers. Since the inception of the factory £1,250,000 has been realised on transactions, while the farmers have received over £1,000,000 from the factory for swine.

FORTHCOMING SHOWS.

Murgon: 17th and 18th May.
Wallumbilla: 22nd and 23rd May.
Ipswich: 23rd and 24th May.
Kilkivan: 23rd and 24th May.
Springsure: 23rd and 24th May.
Beaudesert: 29th and 30th May.
Marburg: 2nd to 4th June.
Mackay: 4th to 7th June.
Woombye: 20th and 21st June.
Lowood: 22nd and 23rd June.
Rockhampton: 21st to 23rd June.
Ithaca: 29th and 30th June.
Kilcoy: 28th and 29th June.
Woodford: 11th and 12th July.
Wellington Point: 14th July.
Caboolture: 19th and 20th July.
Mount Gravatt: 21st July.
Barcaldine: 24th and 25th July.
Rosewood: 25th and 26th July.
Pine Rivers: 27th and 28th July.
Crow's Nest: 31st July and 1st August.
Sandgate: 3rd and 4th August.
Brisbane Royal National: 6th to 11th August.
Belmont: 18th August.
Wynnum: 31st August and 1st September.
Zillmere: 8th September.
Laidley: 13th and 14th September.
Beenleigh: 20th and 21st September
Rocklea: 22nd September.
Toombul: 28th and 29th September.
Kenilworth: 4th October.
Ascot: 24th October.
Pomona: 21st and 22nd November.
Millaa Millaa: 23rd and 24th November.

Answers to Correspondents.

The Use of Arsenic as a Grass Killer on Tennis Courts.

J.E.M. (Garget, Mackay)—

The Agricultural Chemist, Mr. J. C. Brünnich, states that arsenic will not kill the grass permanently, and the treatment will have to be repeated about once a year. Ten pounds of arsenic dissolved with 3 lb. of caustic soda will only make about 50 gallons of spray. Diluting it to 200 gallons would make far too weak a solution. There is no danger to health from the fumes on the court, but horses or cattle might lick the soil or eat the killed grass, and should therefore be kept off.

Hide Tanning.

J.R.C. (Goranba)—

The Director of Agriculture (Mr. H. C. Quodling) advises—

All vessels used in connection with tanning operations should be of wooden or other non-metallic substances. Hides may be tanned either freshly, flayed, or in a salted condition, but stored hides should be kept from heating.

To dehair hides.—Take 6 to 8 lb. of freshly burnt lime in a half-barrel and gradually slake; when slaked add up to 2 gallons of water. Shake the hide to remove all salt, trim thoroughly; and, if of large size, split down the back to facilitate handling. Soak hide, flesh side out, in clean water, suspending the hide on sticks for two or three hours, stirring frequently. After soaking, lay them on a beam hair side up; scrape and scrub well; reverse and remove all flesh off it. Scrape well with the back of a butcher's knife; resoak. Greenhide requires twelve to fourteen hours and salted hides twenty-four to forty-eight; scrape again with a butcher's knife. A "beam" consists of a piece of timber about 2 feet wide and 8 feet long, planed and placed in a sloping position from waist high to about 12 inches above the ground.

Place lime water prepared as above in the barrel previously used for soaking the hide and nearly fill with water; immerse the hides in this till the hair will rub off easily with the palm of the hand. Keep the solution frequently stirred and covered.

Place the hide on the beam and scrape off all hair; if sufficiently soaked a cheesy or curly layer will rub off with the hair. Scrape flesh side as well to remove as much lime as possible. Soak the hide in a barrel of water, to which has been added 9 oz. of 22 per cent. tannery lactic acid or half a gallon of vinegar; soak for twenty-four hours; wash with clean water and soak over night.

The tanning solution should be prepared fifteen or twenty days before the actual operation. Take 30 lb. to 40 lb. finely ground wattle or mangrove bark to 20 gallons hot water; cover and stir frequently. Strain liquor into the barrel and add water to nearly fill it; add 2 quarts vinegar. Soak hides in this solution, stirring and moving them frequently.

Prepare a second lot of tanning solution in the same manner, and when the hides have coloured nicely, remove 5 gallons of the old tan and substitute 5 gallons of the new tan, and add another 2 quarts of vinegar. Repeat this operation every five days, omitting the vinegar. After thirty-five days, add 30 lb. to 40 lb. finely ground bark moistened with hot water; stirring well in order to cover the hides with bark. After six weeks' soaking with continual stirring, half-empty the barrel and fill up with finely ground bark. After two months the hide should be thoroughly tanned. Rinse and rub out all the tan water with a stiff brush and "sticker"; the latter is a piece of brass 6 inches by 4 inches let into a piece of wood along one edge, and is used in a similar manner to that of a scraper. When the hide is damp, but not wet, coat well with neatsfoot or cod oil, hang up and let dry slowly. When dry, damp again and apply a mixture of tallow and neatsfoot, in equal parts, boil and apply warm; dry the hides and sprinkle with sawdust to remove any oiliness.

Land Measurement.

5 L.H. (Torrens Creek)—

The plot, 172 yards by 120 yards, measures 4 acres 1 rood 2 perches and 9½ square yards.

Photographs for Reproduction.

J.G. (26-Mile Creek, Warra)—

The subjects are good, but the prints are not suitable for reproduction. We would much prefer to take our own prints off the negatives. Send them along, and, if desired, we shall return them to you after use. Photographs of suitable rural subjects are always welcome. Thanks.

Syphoning of Acid.

L.M. (Kingaroy)—

Your inquiry was referred to the Agricultural Chemist, Mr. J. C. Brünnich, who advises—

It is always difficult and even dangerous to start a syphon by suction, and it is far better to use pressure. Simply get a large rubber stopper to fit neck of jar tightly, make two holes, one to take the syphon tube, and the other fit with a small piece of glass or metal tubing, to which a bicycle pump can be attached; or even blowing by mouth will start the syphon.

Pig Fattening.

C.N.S. (Clifton)—

Your question, asking how much cracked wheat you will need to feed with butter-milk for fattening pigs was referred to the Agricultural Chemist, Mr. J. C. Brünnich, who advises:—

"A pig 100 lb. live weight requires for fattening a ration containing—

	Dry matter.	Proteins.	Carbohydrates.
	3.6 lb.	.5 lb.	3.2 lb.
1 gallon of butter-milk or skim milk supplies	1.0 lb.	.38 lb.	.92 lb.
4 lb. of crushed wheat ..	2.2 lb.	.30 lb.	1.30 lb.
	3.2 lb.	.68 lb.	2.22 lb.

So that the ration would be rather high in proteins and low in carbohydrates, and the ration should be supplemented by giving a few pounds of sweet potatoes, pumpkins, and mangels, &c."

Weeds for Identification—Tribulus terrestris, Caltrop; Polygonum aviculare.

F.B. (Goomeri)—

The weeds submitted were identified by the Government Botanist, Mr. C. T. White, F.L.S., as follows:—

(1) *Tribulus terrestris* Caltrop., a very bad weed. It is an annual plant and dies down after seeding. The only method of eradication is to cut close down to the ground at the main root before the seeds ripen. The seed-head takes the form of a nasty burr. In South Africa the weed has been proved to poison sheep and goats. It is only apparently poisonous in a fresh stage, feeding experiments with dried plants and even with quite recently cut ones giving negative results.

(2) *Polygonum aviculare.*—Knot weed or knot grass. A bad weed in cultivation, but contains no deleterious properties. Hoe cutting before the seed ripens is the only satisfactory method of eradication.

Pumpkin and Melon Seeds as Food for Stock and Poultry.

G.E. (Nambour)—

The Director of Agriculture, Mr. H. C. Quodling, replies—It is not known that these seeds are harmful to stock but should not be fed to fowls. Mr. J. C. Brünnich, Agricultural Chemist, advises as follows:—Pie melon have only a very low feeding value, and are poorer than pumpkins. Pie melons contain 94 per cent. of water and only ½ per cent. of protein, and 4 per cent. of carbohydrades. According to American reports the seeds contain much nutriment and should not be wasted. Pigs eat them readily; they act as a vermifuge, freeing the animals of worms and putting the digestive organs in good order. As the seeds are rich in protein and oil, eating in excess may cause digestive disturbance. The seeds of pumpkins are reported harmful to fowls, and melon seeds probably act likewise.

A Good Potato Return. Sugar Beet in the Granite Belt.

S.H.H. (Thulimba)—

(1) A return of 7 tons of sound potatoes from 8 cwt. of seed saved locally from last crop is a very satisfactory one, and very much above the average yield throughout Queensland, and even of Tasmania. Your return shows that, given proper attention, satisfactory and payable potato crops can be grown in your district.

(2) Sugar beet growing can only be profitably conducted where large areas are planted within reach of an up-to-date sugar-mill. There is very little likelihood of the industry being established in the Stanthorpe district. Sugar beet, no doubt, could be grown in your locality, and, probably, if selected varieties were planted and cultivation carried out on right lines, a high sugar content would be obtained; but, as already stated, unless the industry is carried out on a large scale, it is quite unlikely to become a commercial success. At the same time, should you wish to grow sugar beet for pigs or other farm stock, it would, no doubt, form a useful addition to animal rations.

Ophthalmia in Poultry.

H.F.H. (Bambaroo, *viâ* Townsville)—

The Poultry Instructor, Mr. J. Beard, advises—Besides the different eye inflammations, such as coryza, chicken pox, and diphtheria, there is another kind of ophthalmia due to minute worms which live under the nictating membrane. In this disease the eyes are watery, become inflamed, and at times the bird loses its sight. The worms are whitish or semi-transparent. The females either lay eggs in the eyes or are carried through the tearduct to the mouth and thence get into the intestines, where their bodies dissociate and the eggs are liberated, the latter are expelled in the stools and hatch on the ground. The larvæ of these worms live on wet ground for a certain time and get into the eyes of other birds when they take their usual dust bath. This disease is not widely spread, but assumes to serious character where it occurs. It can be easily kept in check by treating the birds and disinfecting the run with a strong solution of disinfectant. Any of the following treatments will be found beneficial:—

(1) Instil a few drops equal parts of tincture of Aloes and water three times daily; after three or four days the worms become absorbed.

(2) Instil a few drops one part Argyrol to ten parts water once a day for three or four days.

(3) Place your thumb on the base of the beak, then use pressure working your thumb gradually towards the corner of the eye; by so doing the worms will all be pressed out in one cluster. Wash clean and dry the eye and then instil a few drops of kerosene.

By following the foregoing instructions the worms should soon be eradicated.

Farm and Garden Notes for June.

FIELD.—Winter begins on the 24th of this month, and frosts will already have been experienced in some of the more exposed districts of the Southern coast and on the Darling Downs. Hence insect pests will, to a great extent, cease from troubling, and weeds will also be no serious drawback to cultivation. The month of June is considered by the most successful lucerne-growers to be the best time to lay down this crop, as any weeds which may spring up in the event of a dropping season will be so slow-growing that the young lucerne plants will not be choked by them.

The land should now be got ready for millets, sorghums, panicum, &c. Oats, barley, vetches, clover, tobacco, buckwheat, field carrots, and Swedes may now be sown. Some advocate the sowing of early maize and potatoes during this month, but obviously this can only apply to the more tropical parts of Queensland. The land may be got ready, but in the Southern districts and on the tableland neither maize nor potatoes should be planted before August, or at the earliest, in warm early districts, at the end of July. There is always almost a certainty of frosts, more or less severe, during these months. Arrowroot will be nearly ready for digging, but we would not advise taking up the bulbs until the frosts of July have occurred. Take up sweet potatoes, yams, and ginger. Should there be a heavy crop, and consequently a glut in the market, sweet potatoes may be kept by storing them in a cool place in dry sand, taking care that they are thoroughly ripe before digging. The ripeness may be known by the milky juice of a broken tuber remaining white when dry. Should the juice turn dark, the potato is unripe, and will rot or dry up and shrivel in the sand pit. Before pitting, spread the tubers out in a dry barn or in the open, if the weather be fine. In pitting them or storing them in hills, lay them on a thick layer of sand; then pour dry sand over them till all the crevices are filled and a layer of sand is formed above them; then put down another layer of tubers, and repeat the process until the hill is of the requisite size. The sand excludes the air, and the potatoes will keep right through the winter. Late wheat may still be sown, but it is too late for a field crop of onions. In tropical Queensland the bulk of the coffee crop should be off by the end of July. Yams may be unearthed. Cuttings of cinnamon and kola-nut tree may be made, the cuttings being planted under bell glasses. Collect divi-divi pods and tobacco leaves. English potatoes may be planted. The opium poppy will now be blooming and forming capsules. Gather tilseed (sesame), and plant out young tobacco plants if the weather be suitable. Sugar-cane cutting may be commenced. Keep the cultivator moving amongst the pineapples. Gather all ripe bananas. Fibre may be produced from the old stems.

Cotton crops are now fast approaching the final stages of harvesting. Growers are advised that all cotton in the Central District should be consigned to the Australian Cotton-growing Association, Rockhampton; whilst those in the Southern areas should consign their cotton to the Association at Whinstanes, Brisbane. All bags shuld be legibly branded with the owners' initials. In this matter the consignor is usually most careless, causing much delay and trouble in identifying parcels, which are frequently received minus the address labels.

KITCHEN GARDEN.—Cabbage, cauliflower, and lettuce may be planted out as they become large enough. Plant asparagus and rhubarb in well-prepared beds in rows. In planting rhubarb it will probably be found more profitable to buy the crowns than to grow them from seed, and the same remark applies to asparagus.

Sow cabbage, red cabbage, peas, lettuce, broad beans, carrots, radish, turnip, beet, leeks, and herbs of various kinds, such as sage, thyme, mint, &c. Eschalots, if ready, may be transplanted; also horse radish can be set out now.

The earlier sowings of all root crops should now be ready to thin out, if this has not been already attended to.

Keep down the weeds among the growing crops by a free use of the hoe and cultivator.

The weather is generally dry at this time of the year, so the more thorough the cultivation the better for the crops.

Land for early potatoes should now be got ready by well digging or ploughing.

Tomatoes intended to be planted out when the weather gets warmer may be sown towards the end of the month in a frame where the young plants will be protected from frost.

FLOWER GARDEN.—No time is now to be lost, for many kinds of plants need to be planted out early to have the opportunity of rooting and gathering strength in the cool, moist spring time to prepare them for the trial of heat they must endure later on. Do not put your labour on poor soil. Raise only the best varieties of plants in the garden; it costs no more to raise good varieties than poor ones. Prune closely all the hybrid perpetual roses; and tie up, without pruning, to trellis or stakes the climbing and tea-scented varieties, if not already done. These and other shrubs may still be planted. See where a new tree or shrub can be planted; get these in position; then they will give you abundance of spring bloom. Renovate and make lawns, and plant all kinds of edging. Finish all pruning. Divide the roots of chrysanthemums, perennial phlox, and all other hardy clumps; and cuttings of all the Summer bedding plants may be propagated.

Sow first lot, in small quantities, of hardy and half-hardy annuals, biennials, and perennials, some of which are better raised in boxes and transplanted into the open ground, but many of this class can, however, be successfully raised in the open if the weather is favourable. Antirrhinum, carnation, picotees, dianthus, hollyhock, larkspur, pansy, petunia, *Phlox Drummondi*, stocks, wallflower, and zinnias, &c., may be sown either in boxes or open beds; mignonette is best sown where it is intended to remain. Dahlia roots may be taken up and placed in a shady situation out of doors. Plant bulbs such as anemones, ranunculus, freesias, snowflakes, ixias, watsonias, iris, narcissus, daffodils, &c. Tulips will not suit the Queensland climate.

To grow these plants successfully, it is only necessary to thoroughly dig the ground over to a depth of not less than 12 in., and incorporate with it a good dressing of well-decayed manure, which is most effectively done by a second digging; the surface should then be raked over smoothly, so as to remove all stones and clods, thus reducing it to a fine tilth. The seed can then be sown in lines or patches as desired, the greatest care being taken not to cover deeply; a covering of not more than three times the diameter of larger seeds, and a light sprinkling of fine soil over small seeds, being all that is necessary. A slight mulching of well-decayed manure and a watering with a fine-rosed can will complete the operation. If the weather prove favourable, the young seedlings will usually make their appearance in a week or ten days; thin out so as to leave each plant (if in the border) at least 4 to 6 in. apart.

Orchard Notes for June.

THE COAST DISTRICTS.

The remarks that have appeared in these notes for the past two months apply in a great measure to June as well, as the advice that has been given regarding the handling, grading, packing, and marketing of the citrus crop still holds good. As the weather gets cooler the losses due to the ravages of fruit flies decrease, as these insects cannot stand cold weather, and consequently there is only an odd one about. The absence of flies does not, however, permit of any relaxation in the care that must be taken with the fruit, even though there may be many less injured fruit, owing to the absence of fruit-fly puncture, as there is always a percentage of damaged fruit which is liable to speck, which must be picked out from all consignments before they are sent to the Southern States, if a satisfactory return is to be expected. If the weather is dry, citrus orchards must be kept in a good state of tilth, otherwise the trees may get a setback. Old worn-out trees can be dug out and burnt; be sure, however, to see that they *are* worn out, as many an old and apparently useless tree can be brought round and made to bear good crops, provided the trunk and main roots are still sound, even though the top of the tree is more or less dead. The whole of the top of the tree should be cut off and only the trunk and such sound main limbs left as are required to make a new head. The earth should be taken away from around the collar of the tree, and the main roots exposed, any dead roots being cut away and removed. The whole of the tree above ground and the main roots should then be dressed with a strong lime sulphur wash, or Bordeaux paste. The main roots should be exposed for some time, not opened up and filled in at once. Young orchards can be set out now, provided the ground is in good order. Don't make the mistake of planting the trees in improperly prepared land—it is far better to wait till the land is ready, and you can rest assured it will pay to do so in the long run.

When planting, see that the centre of the hole is slightly higher than the sides, so that the roots, when spread out, will have a downward, not an upward tendency; set the tree at as nearly as possible the same depth as it was when growing in the nursery, cut off all broken or bruised roots, and spread those that remain evenly, and cover them fine top soil. If the land is dry, the tree should then be given a good watering, and when the water has soaked in, the hole can be filled up with dry soil. This is far better than watering the tree after the soil has been placed round it and the hole filled up. Custard apples will be ripening more slowly as the nights get colder, and if the weather becomes unduly cold, or if immature fruit is sent South, the fruit is apt to turn black and be of no value. This can easily be overcome by subjecting the fruit to artificial heat, as is done in the case of bananas during the cooler part of the year, when it will ripen up properly and develop its flavour. Grade custard apples carefully, and pack in cases holding a single layer of fruit only for the Southern markets.

Pineapples, when at all likely to be injured by frost, should be protected by a thin covering of bush hay, or similar material. The plantation should be kept well worked and free from weeds, and slow-acting manure, such as bone dust or island phosphates, can be applied now. Lime can also be applied when necessary. The fruit takes longer to mature at this time of the year, consequently it can be allowed to remain on the plant till partly coloured before gathering for the Southern markets, or can be fully coloured for local use.

Banana plantations must be kept worked and free from weeds, especially if the weather is dry, as a severe check to the plants now means small fruit later on. Bananas should be allowed to become full before the fruit is cut, as they will carry all right at this time of the year; in fact, there is more danger of their being injured by cold when passing through New England by train than there is of their ripening up too quickly.

Bear in mind the advice given with regard to the handling, grading, and packing of the fruit. It will pay you to do so. Land intended for planting with bananas or pineapples during the Spring should be got ready now.

Strawberries require constant attention, and unless there is a regular and abundant rainfall they should be watered regularly. In fact, in normal seasons, an adequate supply of water is essential, as the plants soon suffer from dry weather, or strong, cold westerly winds. Where not already done, vineyards should be cleaned up ready for pruning—it is, however, too early to prune or to plant out new vineyards.

THE GRANITE BELT, SOUTHERN AND CENTRAL TABLELANDS.

All kinds of deciduous fruit trees are now ready for pruning, and this is the principal work of the month in the orchards of the Granite Belt Area. Don't be frightened to thin out young trees properly, or to cut back hard—many good trees are ruined by insufficient or bad pruning during the first three years. If you do not know how to prune, do not touch your trees, but get practical advice and instructions from one or other of the Departmental officers stationed in the district. In old orchards do not have too much bearing wood; cut out severely, especially in the case of peaches, or you are likely to get a quantity of small unsaleable fruit. There are far too many useless and unprofitable fruit trees in the Granite Belt Area which are nothing more or less than breeding-grounds for pests, such as fruit fly, and are a menace to the district. Now is the time to get rid of them. If such trees are old and worn out, take them out and burn them, but if they are still vigorous, cut all the tops off and work them over with better varieties in the coming season—apples by grafting in spring and peaches and other stone fruits by budding on to young growth in summer. Planting can start now, where the land is ready and the trees are to hand, as early planted trees become well established before spring and thus get a good start. Be very careful what you plant. Stick to varieties of proved merit, and few at that, and give so-called novelties and inferior sorts a wide berth. Take the advice of old growers, and do not waste time experimenting with sorts that have probably been tested in the district, and turned down years ago. When land is intended for planting this season, see that it is well prepared and well sweetened before the trees are put in, as young trees seldom make a good start when planted in sour and badly prepared land.

Slowly acting manure—such as bonedust, meatworks manure, or island phosphates—can be applied now, as they are not liable to be washed out of the soil, and they will be available for the use of the trees when it starts growth in spring. Lime can also be applied where required. Badly-drained land should be attended to, as no fruit trees will thrive with stagnant water lying round their roots.

On the Downs and Tableland all kinds of fruit trees can be pruned now, and vines can be pruned also in any district where there is no danger from late frosts, and where this can be done the prunings should be gathered and burnt and the vineyard ploughed up and well worked to reduce the soil to a good state of tilth, so that should rain come it will absorb all that falls and the moisture can be kept in the soil by cultivation subsequently.

Citrus fruits will be at their best in the Western districts. The trees should be watered if they show signs of distress, otherwise all that is necessary is to keep the surface of the land well worked. All main-crop lemons should be cut by this time, as if allowed to remain longer on the tree they only become overgrown and are more suitable for the manufacture of peel, whereas if cut and cased now they will keep in good order so that they can be used during the hot weather.

ASTRONOMICAL DATA FOR QUEENSLAND.

TIMES COMPUTED BY D. EGLINTON, F.R.A.S.

TIMES OF SUNRISE AND SUNSET.

AT WARWICK.

1923.	APRIL.		MAY.		JUNE.	
Date.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.
1	6·3	5·49	6·20	5·19	6·37	5·2
2	6·4	5·48	6·20	5·18	6·37	5·2
3	6·4	5·47	6·21	5·17	6·38	5 2
4	6·5	5·46	6·21	5·16	6·38	5·2
5	6·5	5·45	6·22	5·15	6·39	5·1
6	6·6	5·44	5·22	5·14	6·39	5·1
7	6·6	5·43	6·23	5·13	6·40	5·1
8	6·7	5·42	6·23	5·13	5·40	5·1
9	6·7	5·41	6·24	5·12	6·41	5·1
10	6·8	5·40	6·24	5·12	6·41	5·1
11	6·8	5·39	6·25	5·11	6·41	5·1
12	6·9	5·37	6·26	5·11	6·42	5·1
13	6·9	5·36	6·26	5·10	6·42	5·1
14	6·10	5·35	6·27	5·10	6·42	5·1
15	6·10	5·34	6·27	5·9	6·42	5·2
16	6·11	5·32	6·28	5·8	6·43	5·2
17	6·11	5·31	6·29	5·8	6·43	5·2
18	6·12	5·30	6·29	5·7	6·43	5·2
19	6·12	5·29	6·30	5·7	6·43	5 2
20	6·13	5·28	5·30	5·6	6·44	5·2
21	6·14	5·27	6·31	5·6	6·44	5·2
22	6·14	5·26	6·31	5·5	6·44	5·2
23	6·15	5·25	6·32	5·5	6·44	5·3
24	6·15	5·24	6·32	5·4	6·44	5·3
25	6·16	5·23	6·33	5·4	6·45	5·3
26	6·17	5·22	6·34	5·4	6·45	5·4
27	6·17	5·21	6·34	5·3	6·45	5·4
28	6·18	5·21	6 35	5·3	6 45	5·4
29	6·18	5·20	6·35	5·3	6 45	5·5
30	6·19	5·20	6·36	5·3	6·45	5·5
31	...	...	6 36	5·2	...	....

PHASES OF THE MOON, OCCULTATIONS, &c.

The times stated are for Queensland, New South Wales, Victoria, and Tasmania when "Summer" Time is not used.

1 April	○	Full Moon	11	10 p.m.
8 „	☽	Last Quarter	3	22 p.m.
16 „	●	New Moon	4	28 p.m.
24 „	☾	First Quarter	3	20 p.m.

Perigee on 2nd at 7.24 a.m., and 30th at 6.24 p.m.

The Full Moon will be apparently very near to Saturn and Spica on the nights of April 1 and 2.

On the 19th the Moon in Crescent form will pass Mars soon after Sunset.

On Sunday, 29th April, an interesting Occultation of Saturn will take place about 5 p.m., Saturn reappearing about 6 p.m. Saturn will also be Occulted on 26th May, about Midnight.

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1 May	○	Full Moon	7	30 a.m.
8 „	☽	Last Quarter	4	18 a.m.
16 „	●	New Moon	8	38 a.m.
24 „	☾	First Quarter	12	25 p.m.
30 „	○	Full Moon	3	7 p.m.

Apogee on the 13th, at 2.48 p.m.
Perigee on the 29th, at 1.48 a.m.

Jupiter will be in opposition to the Sun at Midnight on the 5th, when it will be nearly overhead.

Mercury being at its greatest eastern elongation about the 5th should be visible between the Pleiades and Hyades soon after Sunset.

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6 June	☽	Last Quarter	7	19 p.m.
14 „	●	New Moon	10	42 p.m
22 „	☾	First Quarter	6	46 a m.
28 „	○	Full Moon	11	4 p.m.

Apogee on the 10th, at 4.30 a.m.
Perigee on the 25th, at 11.30 p.m.

About an hour before Sunrise on the 12th the Moon in Crescent form and the beautiful planet Venus will afford a fine celestial picture somewhat low down in the East with the Pleiades north of them.

For places west of Warwick and nearly in the same latitude, 28 degrees 12 minutes S., add 4 minutes for each degree of longitude. For example, at Inglewood, add 4 minutes to the times given above for Warwick; at Goondiwindi, add 8 minutes; at St. George, 14 minutes; at Cunnamulla, 25 minutes; at Thargomindah, 33 minutes; and at Oontoo, 43 minutes.

The moonlight nights for each month can best be ascertained by noticing the dates when the moon will be in the first quarter, and when full. In the latter case the moon will rise somewhat about the time the sun sets, and the moonlight then extends all through the night; when at the first quarter the moon rises somewhere about six hours before the sun sets, and it is moonlight only till about midnight. After full moon it will be later each evening before it rises, and when in the last quarter it will not generally rise till after midnight.

It must be remembered that the times referred to are only roughly approximate, as the relative positions of the sun and moon vary considerably.

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